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Analytic Design of a Family of Supersonic Nozzles by the Friedrichs Method, Including Computation Tables and a Summary of Calibration Data

NAVAL SUPERSONIC LABORATORY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June, 1954

WRIGHT AIR DEVELOPMENT CENTER

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Judson R. Baron

with contributions by:

Eugene E. Covert
Leon H. Schindel
Marvin W. Sweeney
Edward B. Temple

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FOREWORD

This report was prepared by Judson R. Baron, with contributions by Eugene E. Covert, Leon H. Schindel, Marvin W. Sweeney, and Edward B. Temple of the Analysis and Research Group of the Naval Supersonic Laboratory, Massachusetts Institute of Technology, Cambridge, Massachusetts on Air Force Contract No. AF 33(616)-2132, under Expenditure Order No.R-465-6 BR-1.

ABSTRACT

The design procedure for the family of supersonic nozzles in use at the Naval Supersonic Laboratory of the Massachusetts Institute of Technology is herein presented. The basis for the potential-flow design is the analytic method first outlined by Friedrichs, to which has been added some results which furnish a higher order of approximation to the nozzle contour. The implied mathematical convergence in the method is discussed and reference is made to continuous curvature streamlines. The accumulated computations of the Laboratory are tabulated for the convenience of those wishing to avail themselves of the family of contours successfully used. Experimental results from calibrations conducted within the uniform flow region and at the nozzle boundaries are presented, and interpretations are given in terms of the design, fabrication, measurement accuracy, and model requirements.

PUBLICATION REVIEW

The publication of this report does not constitute approval by the Air Force of the findings or the conclusions contained therein. It is published only for the exchange and stimulation of ideas.

FOR THE COMMANDER:

LESLIE B. WILLIAMS, Colonel, USAF
Chief, Aeronautical Research Laboratory
Directorate of Research

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INTRODUCTION

In describing improvements made in the flow in an early supersonic wind tunnel, Bailey and Wood[1*] speak of "arranging the flare so that ... the velocity rises smoothly to its working value. By this means, the variation of velocity along the axis was reduced from about 30% to 10%." The achievement of supersonic flow at that time was, in itself, an accomplishment of some magnitude without requiring that the flow be uniform. Today the supersonic wind tunnel is a research tool and no longer an aerodynamic curiosity; it must provide uniform test conditions which will make the obtained data both accurate and repeatable.

A continuous supersonic wind tunnel normally utilizes about 3,000 horsepower to blow air through each square foot of test section. The purpose of this large expenditure of power is to produce a region of uniform supersonic flow in which models may be tested. Given sufficient pressure ratio, the Mach number and uniformity of the flow are determined completely by the shape of the supersonic nozzle. Moreover, any irregularity in the nozzle contour will cause a pressure disturbance to be propagated into the wind stream where it may affect the model. Thus, considerable effort can be expended justifiably in the design, manufacture, and calibration of wind-tunnel nozzles.

The first question, of course, is:- How uniform must the flow be? The answer depends upon the type of test and the accuracy of force, pressure, and other types of measuring instruments which are to be available. In a force test of a supersonic configuration, for example, pressure irregularities may produce only a small over-all effect on the model forces and moments; if, however, they are spaced so as to increase the wing force while reducing the load on the tail, it is possible that intolerable errors will be incurred in the pitching moment. Variations in flow angle may also cause erroneous forces and moments, and even change the slope of these curves with angle of attack. Small fluctuations of pressure, which have little effect on a force model, may cause a sufficient disturbance to make

*Superscripts refer to References listed in Section 12

boundary-layer research impossible. Since the same nozzle is likely to be used for many types of investigations, it is desirable to make the flow as uniform as the available time, equipment, and manpower will allow.

Although uniform flow is a desirable goal, it is not easily attained; in pursuit of this ideal it is convenient to consider three distinct divisions of effort. The foremost difficulty of the design lies in the fact that the governing differential equation is non-linear, and, while useful exact solutions are known, much depends upon both tedious and approximate numerical or graphical computations. Furthermore, the non-linear wave equation does not account for the effects of viscosity. Allowance must, therefore, be made for a boundary layer for which only approximate solutions are available, and which is in reality a three-dimensional phenomenon that cannot be compensated for perfectly in a "two-dimensional" nozzle. Lastly, the final design must be carried through various stages of manufacture, during which the cost of fabrication rises sharply as the tolerances are made smaller.

The one-dimensional method used by Bailey and Wood, and others to design early supersonic nozzles is inadequate in the light of modern requirements. For the non-viscous design, a solution of the two-dimensional wave equation is necessary. A procedure for achieving uniform flow was first suggested by Prandtl and Busemann,[2] in which use was made of the method of characteristics. In this country, modifications of the Prandtl-Busemann procedure were proposed by Foelsch[3] and Puckett.[4]

In the latter methods, the design originates on a line through the inflection point (Fig. 1) on which a particular Mach-number distribution is assumed. The remainder of the nozzle downstream, a "simple wave region" as defined by Courant and Friedrichs,[5] may be deduced on the basis of the prescribed initial conditions, while the upstream portion may be determined by working upstream toward the throat with the method of characteristics.

A nozzle-design procedure which does not directly employ the mathematical method of characteristics was described by a panel headed by K. O. Friedrichs[6,7] at New York University. A series solution of the non-linear wave equation was used, only the leading terms in the series being

retained. Both the method of characteristics and the series solution give exact solutions of the wave equation provided that in the former case the mesh size is infinitesimal, and that in the latter case an infinite number of terms is handled. To the extent that neither is possible in practice, both solutions are approximate. The series solution, however, affords a means of determining both the subsonic and the supersonic portions of the nozzle, and furthermore is expressible in an analytic form in which pre-computed tables may be used to advantage. This method has been exploited and expanded at the Naval Supersonic Laboratory (NSL) as a basis for the non-viscous design procedure.

In the process of designing, fabricating, and calibrating even a few supersonic nozzles, problems are encountered, procedures developed, and numbers compiled which may be of considerable value to other nozzle designers. It is the purpose of this report to collect and to make available such information and experience that may be of interest. Although some calculations were made at this Laboratory using the graphical method of characteristics, these never were applied to the manufacture of an actual nozzle. All nozzles for the 18 in. x 24 in. wind tunnel at the NSL were designed (since 1947) by the method developed at New York University,[6,7] and extended and applied by Nilson.[8,9] The relations and tables presented herein for the basic non-viscous design are all applicable to this procedure and will henceforth be designated as the Friedrichs method.

The tables are primarily for use in designing fixed nozzles; other types of nozzles are discussed, however, including possible modifications of the Friedrichs method which make it applicable to flexible nozzles.

To make the tables as complete and useful as possible, discussions are included of various types of nozzles, methods of calibration, and calibration and boundary-layer data obtained in the NSL Wind Tunnel. Consideration is also given to the correction for viscous effects as well as to a technique which has proven adequate as a check of the manufacturing process.

SECTION 2

SYMBOLS

A	area
a	velocity of sound
a_i	coefficients in power-series expansion for h
C^*	curvature tolerance
c_p	specific heat at constant pressure
F, G, H	coefficients in power-series expression for slope of "design characteristic"
f	scale factor
H^*	boundary-layer shape parameter ($= \delta^*/\theta^*$)
h	nozzle-generating parameter ($= \rho^* V^*/\rho V$)
h_r	rise of arc
h_T	test-section semi-height
h_E	nozzle-entrance semi-height
k	thermal conductivity
k_d	span of fixed legs of waviness gage
L	nozzle length, over-all
L^*	wavelength of contour waviness
L_A^*	wavelength of Mach-number perturbation
ℓ	nozzle length, supersonic portion
M	Mach number ($= V/a$)
N	inverse exponent in power-law boundary-layer profile
Pr	Prandtl number ($= c_p \mu/k$)
p	pressure
q	velocity
R	gas constant
R^*	radius of curvature at throat

RN	Reynolds number (= $\rho Vx/\mu$)
r	recovery factor
$\bar{r}$	test-rhombus semi-length
s	arc length along streamline
T	temperature
U	velocity at outer edge of boundary layer
u	velocity within boundary layer
u, v	velocity components in x, y directions, respectively
V	velocity
x, y	cartesian coordinates (Note: in some instances y is radial component of axisymmetric configuration cut by plane)
x_i, y_i	coefficients in power-series expansion for streamline
α	Mach angle
$(\ )_{aw}$	adiabatic wall condition
β	slope of characteristic
β_s	shock angle
γ	ratio of specific heats (= 1.400 for air)
δ	boundary-layer thickness
δ^*	boundary-layer displacement thickness
δ_i	coefficient in power-series expansion for q
ι	waviness superimposed on exact contour
ζ	dimensional parameter (= 2 for two-dimensional case; = 3 for axisymmetric case)
η	streamline parameter
θ^*	boundary-layer momentum thickness
θ	flow inclination with respect to line of symmetry
θ_i	coefficient in power-series expansion for θ

θ_s	wedge semi-angle
Λ	ξ_d/ξ_I
λ	apparent reflection height
μ	dynamic viscosity
ξ	potential line parameter
ρ	density
σ	coordinate tolerance
ϕ, Φ	potential function
ψ	stream function
τ	skin-friction stress
$(\;)^{o}$	free-stream (static) condition
$(\;)_{o}$	stagnation condition
$(\;)^{*}$	sonic reference condition
$(\;)_w$	wall condition
$(\;)_d$	design condition
$\overline{(\;)}$	nozzle-axis condition
$(\;)_I$	inflection-point condition

SECTION 3

PREVALENT DESIGN METHODS

Before entering into the specific details of the Friedrichs method in the next section, it is pertinent to review briefly some of the design procedures that have been advanced, the majority of them within the last decade. In general, each offers advantages from a specific viewpoint (for example: computational ease, minimum nozzle length, or variable Mach number); on the other hand, each is limited in scope (in such respects as: excessive viscous effects, maximum Mach number, or man-hours required). In the following, a preliminary comparison of the available techniques is attempted so as to offer some basis for the advantages and disadvantages mentioned in the Friedrichs analysis.

3.1 Wave Equation

As mentioned earlier, the starting point of supersonic nozzle design is the potential flow associated with an inviscid gas. The appropriate non-linear wave equation for the two-dimensional case is,

$$\left(1-\frac{u^2}{a^2}\right)\frac{\partial^2\phi}{\partial x^2}-2\left(\frac{uv}{a^2}\right)\frac{\partial^2\phi}{\partial x\partial y}+\left(1-\frac{v^2}{a^2}\right)\frac{\partial^2\phi}{\partial y^2}=0 \qquad (3{:}01)$$

where u and v are the velocity components in the orthogonal (x, y) directions, a is the local velocity of sound, and ϕ is the velocity potential such that

$$u=\frac{\partial\phi}{\partial x} \qquad v=\frac{\partial\phi}{\partial y} \qquad (3{:}02)$$

It is the purpose of the nozzle contour to provide a suitable boundary condition which in combination with Eq. (3.01) will produce a uniform supersonic flow suitable for test purposes.

In the supersonic portion of the nozzle, the governing wave equation is hyperbolic: hence the flow contains real characteristics.[5, 10] These characteristics correspond to wave fronts along which disturbances are propagated and follow physically as a result of the fact that the medium is

traveling faster than its own propagation velocity. A well-known example with radially-emanating characteristics arises in the so-called Prandtl-Meyer flow around a corner,[11, 12, 13] which constitutes an exact solution for the two-dimensional wave equation. In general, there exists an intersecting network of left and right running characteristics, sometimes referred to as members of the first and second families.

This network is useful since the specification of conditions along a non-characteristic segment defines the properties within a triangle formed by that line and the characteristics passing through its end points. Similarly, conditions being specified along segments of two intersecting characteristics imply the solution within a characteristic-bounded rectangular section. The step-by-step calculation, made possible by these properties, is known as the "method of characteristics."[14] Starting with an initial line along which the stream properties are either known or assumed, the double family of characteristics may be drawn as straight lines through points on a curve. The properties at the first intersections of the characteristics are then determined, which defines the directions in which subsequent characteristics are to be extended, and the process repeated. The number of points chosen along the initial curve determines the spacing of the intersections (mesh size) and the solution becomes more accurate as the mesh is made finer. The penalty for such an increase in accuracy is the increased computation time.

Although the expression "characteristics method" has acquired a specific meaning in present-day use with regard to a design method, the object of <u>all</u> methods is to obtain a flow in which one family of characteristics becomes a set of straight Mach lines, while the other family reduces to a single characteristic. The stream properties in this "simple wave" region may then be obtained from the Prandtl-Meyer solution.

If it is assumed that the flow is uniform over each cross section of a channel, the one-dimensional equation for isentropic flow serves to define the Mach number as a function of the cross-sectional area:

$$\left(\frac{A}{A^*}\right)^2 = \frac{1}{M^2}\left[\frac{2}{\gamma+1}\left(1+\frac{\gamma-1}{2}M^2\right)\right]^{(\gamma+1)/(\gamma-1)} \qquad (3{:}03)$$

The use of this simple design relation is unfortunately restricted to extremely long nozzles in which case the viscous effects will predominate. Interest will be restricted here to reasonable lengths; but it will be seen that Eq. (3:03) plays a basic role in the Friedrichs analysis, which does achieve practical contours.

To produce a uniform flow region at a particular Mach number, there are an infinite number of possible contours which depend upon the choice of an initial curve and the imposed boundary near the minimum section. Since the characteristics are imaginary in the subsonic region, it has been fairly standard practice to assume straight sonic lines and attempt to shape the subsonic entrance contour to match this choice. This constitutes one of the major disadvantages for the majority of procedures.

3.2 Available Procedures

The first application of the method of characteristics to wind-tunnel design was made by Prandtl and Busemann[2] in 1929. They first computed the maximum expansion angle which would produce the desired flow in the test region without requiring compression waves: one half (for a symmetrical nozzle) of the hodograph angle from sonic velocity to the design Mach number. An arbitrary curve was then made to increase monotonically in slope from zero at the throat until the maximum expansion angle was reached. Dividing the curve into straight segments of convenient length, and assuming a uniform sonic flow at the minimum section allowed application of the method of characteristics as a step-by-step calculation. Downstream of the inflection point the wall was shaped so as to cancel the reflections of incoming waves; the contour was then tangent to the flow after each characteristic and a simple wave region was produced.

The basic Prandtl-Busemann exposition was explained and amplified in 1946 by A. E. Puckett[4] who pointed out that lesser expansion angles were permissible. The resulting nozzle with a gentler slope would be longer, but might have a more uniform final flow. Puckett also suggested the possible simplification in assuming uniform radial flow at the maximum slope cross section, corresponding to the inflection point. Only the downstream-flow region is then calculated, and a smooth curve is faired back to the

throat from the inflection point. It was Puckett's observation that a reasonable choice of such a curve would yield the uniform radial flow assumed.

Still another design procedure was advocated by Foelsch[3] in 1946. He assumed that the Mach number was constant on a circular arc, intersecting and perpendicular to the contour at the inflection point. A further assumption was that on the Mach line through the inflection point the velocity vectors intersect at the center of the circle of constant Mach number, and that in the region between this circle and the Mach line through the inflection point the velocity was a function only of the distance from the center, permitting an analytic determination of the nozzle contour downstream of the inflection point. The upstream flow field must then be determined by the use of the method of characteristics, or, as suggested by Puckett, a smooth transition curve may suffice.

In principle, it is possible to dispense with the initial expansion contour upstream of the inflection point by making the latter coincident with the throat. The resulting sharp-cornered nozzles have been investigated by Edelman,[15] and Shames and Seashore.[16] Choosing the maximum expansion angle for the sharp corner, one obtains the shortest physical nozzle; moreover, the simple wave region in this case represents a relatively larger area of the nozzle, thereby making an important saving in computation time. Unfortunately, troubles may arise due to viscous effects at the corner.

An interesting approach to the simplification of the design problem was offered by Cunsolo[17] in the application of only the Prandtl-Meyer relations to a series of constant section channels joined by the easily-computed Prandtl-Meyer streamlines. The construction difficulties of the oscillating centerline, as well as the viscous effects and over-all length requirements appear severe, although the simple coordinate specifications remain inviting.

The practical requirements involved in nozzle handling and time delays during test periods have brought forth several methods which permit a quick change from one design Mach number to another. Evvard and

Wyatt[18] combined a flat plate, which rotated about one end located at the throat, with an opposing Prandtl-Meyer streamline making it possible to vary the Mach number at will. The resulting configuration suffers from the sharp-corner effect and is asymmetrical. A sonic-line assumption is implicit.

Symmetry may be retained with a completely flexible contour which has been constructed with jack-supported stainless-steel sheets. The final contour may be adjusted advantageously during calibration, but a suitable family of contours should be provided for the most judicious use of the jack positions. An incompatibility between the aerodynamic and structural requirements is introduced if a point of discontinuous curvature exists at the inflection point. This has led the way to the development of continuous curvature nozzles[19, 20, 21] which, as will be shown later, are necessarily of longer length. To circumvent this, Dhawan[22] proposed the use of a concentrated moment applied to the sheet at the inflection point, which implies a fixed length from the inflection point to the exit plane for all design conditions.

A variable Mach-number nozzle with a distinct design procedure is an outgrowth of original suggestions by Silverstein of the NACA. He recommended employing a movable plug in the minimum section to exercise control over the throat height. The wake and disturbances from the trailing edge of the plug were not easily corrected with this arrangement. Allen[23] later suggested the use of an asymmetrical configuration of the same type. Design procedures are given by Syvertson and Savin,[24] and Burbank and Byrne[25] for uniform flow at two Mach numbers. The variation in test Mach number is obtained by sliding one block relative to the other; thus the use of the complete range of values between the design conditions is possible. To obtain the flow pattern, the usual method of characteristics is employed and portions of one contour that are unnecessary for one design situation, are used to produce uniform flow at the other design condition. At Mach numbers above approximately 3, the method requires the averaging of several contours so that an "exact" design condition is violated.

Axisymmetrical nozzles may be designed by a modification of the

Foelsch procedure[26] and by the Friedrichs method.[6,7] In small sizes this type of nozzle may be easy to fabricate, but suffers from being unsuitable for schlieren observation. More important, errors in design or fabrication introduce disturbances which tend to focus on the nozzle axis.

True three-dimensional nozzles may be developed by transformation methods applied to known axisymmetric contours.[27] The throat retains a circular section while the exit plane may have an arbitrary shape. Construction problems appear great; however, the convenient circular throat is an advantage for high Mach-number designs.

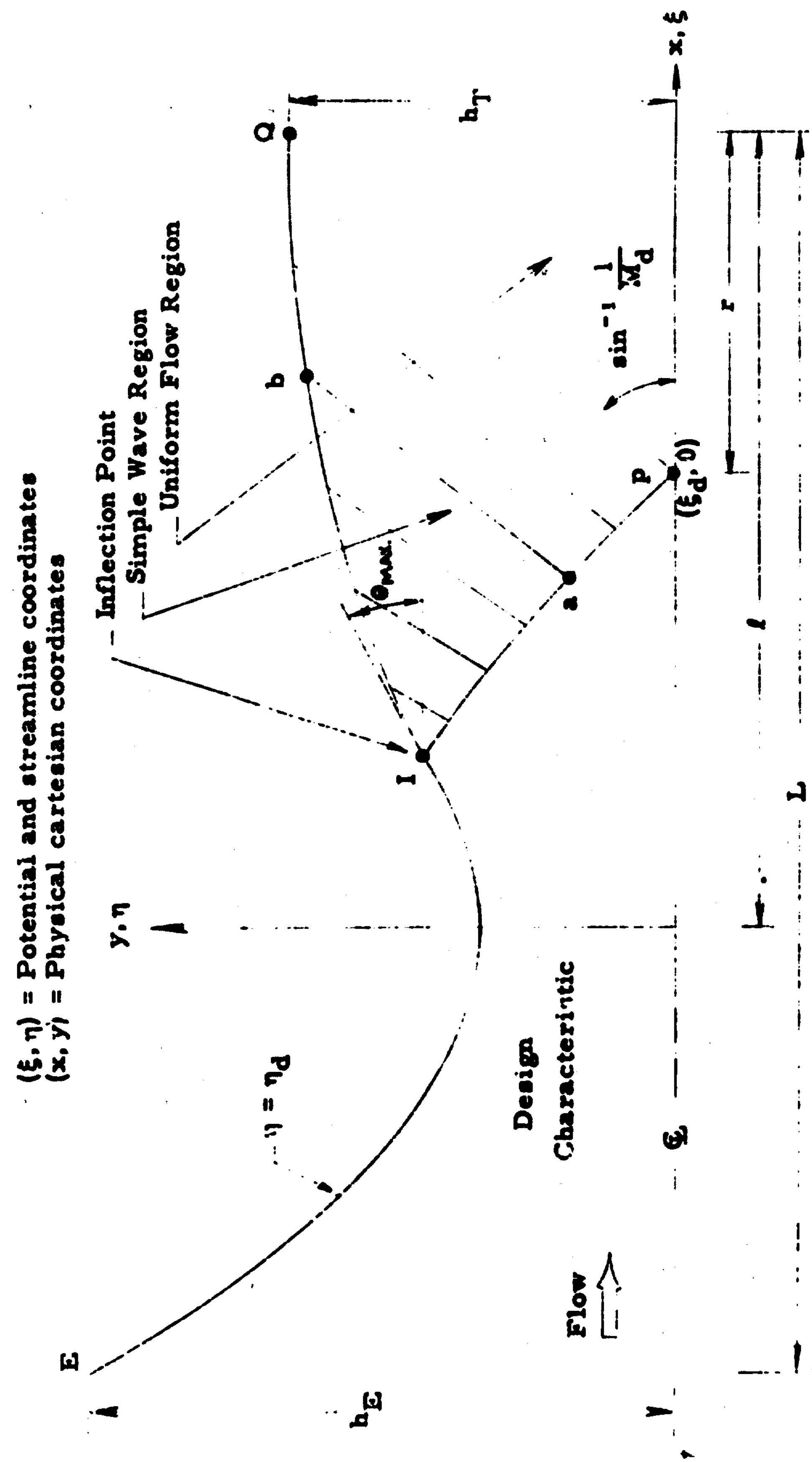

Fig. 1 Nozzle geometry

SECTION 4

FRIEDRICHS METHOD

The Friedrichs method[6,7] offers a completely analytic approach to the problem of supersonic nozzle design. The procedure originated from a study of nozzles for rocket motors for which high efficiency in combination with short length was desirable. In detail, the analysis was thus confined to the axially symmetric case. Subsequently, Nilson[8,9] adapted the method to a two-dimensional configuration.

Assuming a somewhat arbitrary velocity distribution along the axis, a series solution may be employed to express the pertinent properties in the flow field adjacent to the axis. The solution is valid in both the subsonic and supersonic portions of the field, and no assumptions need be made with respect to the disposition of the sonic line. Characteristic lines of the field may be computed by a numerical integration process, and downstream from one of these the flow may be made uniform by a simple mass-flow criterion for the simple-wave region streamlines.

Only a few terms of the series solution are retained in practice. By examining the series, it is possible to estimate the magnitude of the errors introduced by the discarded terms. Comparatively, the check calculation required in the method of characteristics involves a repetition of the computations with a finer mesh size.

A review of the Friedrichs analysis may be found in several sources.[6,7,8,9,28] In addition, Liepmann[29] has recently completed an analysis which introduces the curvature of the reference axis as a parameter and thereby permits the design of asymmetric nozzles. The present section will, therefore, be confined to a discussion of the method and a presentation of the relations required for the computational process. In part, these represent forms found useful in the application of the procedure to the nozzles of the NSL. Further details of the derivation are provided in Appendix I.

4.1 Nozzle-Generating Function

Consideration is to be given to the necessary correction to a one-

dimensional potential flow to account for the two-dimensional effect introduced by the use of a finite length. The correction is based upon a power-series expansion of which the lowest order terms are, in fact, applicable to the so-called "hydraulic approximation."

Suppose that the normalized lateral dimension of a "one-dimensional" channel (i.e., either the radius or semi-height in units of the throat height) is a known function of the distance along the channel, and is denoted by $\overline{h}(x)$. Then the axial Mach-number distribution is completely specified for any polytropic process by

$$\overline{h} = \frac{\rho^* V^*}{\overline{\rho}\,\overline{V}} = \frac{1}{\overline{M}}\left[\frac{2}{\gamma+1}\left(1 + \frac{\gamma-1}{2}\,\overline{M}^2\right)\right]^{(\gamma+1)/2(\gamma-1)} \tag{4:01}$$

or, with the ratio of specific heats, γ, taken equal to 1.40

$$\overline{h} = \frac{(\overline{M}^2 + 5)^3}{216\,\overline{M}} \tag{4:02}$$

When the total pressure and total temperature are specified, all of the gas properties are known throughout the nozzle. On physical grounds, there are two objections to a design based on Eq. (4:01). There are the mechanical difficulties involved in the storage and handling of the excessively long nozzle, as well as the entrenchment of a rather large viscous layer for the same reason.

Instead, let $h(x, y)$ be the actual distribution of a lateral dimension in a two-dimensional or axially symmetric nozzle in analogy to $\overline{h}(x)$; we will refer to $\overline{h}(x, y)$ as the "nozzle-generating function." Since this is effectively the same process as specifying the velocity distribution along the axis, $q(x)$, the surface of the nozzle will be a stream surface corresponding to either $\overline{q}(x)$ or $h(x, y)$. Let η denote the streamline coordinate and ξ the orthogonal equipotential surfaces such that $x = \xi$ when $\eta = 0$. Now since $h(\xi, \eta)$ represents a correction to $\overline{h}(x) = \overline{h}(\xi)$, it is reasonable to assume

$$h(\xi, \eta) = \bar{h}(\xi) \sum_i a_i(\xi)\eta^i \quad (i = > 0) \tag{4:03}$$

For a straight nozzle centerline it is clear from symmetry that the coefficients a_i vanish for i odd and $a_0 = 1$. Similar series may be assumed for the velocity, q, its inclination, θ, with respect to the axis, and the contour coordinates, (x, y). From symmetry considerations, it can be seen that such series involve only even powers of η for q and x, and only odd powers of η for θ and y. It proves convenient to identify all coefficients in the computational process with the parameter ξ.

Certain restrictions exist in the choice of $\bar{h}(\xi)$. Since the origin of the coordinates in the (ξ, η) plane is taken at the intersection of the sonic line with the $\eta = 0$ axis, it follows from Eq. (4:02) that $\bar{h}(0) = 1$. In addition, from the physical interpretation of $\bar{h}$ as an area ratio, it is seen that $\bar{h}(0)$ must be a relative minimum of $\bar{h}(\xi)$. However, a more severe restriction than this is required. Friedrichs[6] asserts that $\bar{q}(x)$ must be a smooth and analytic function; that is, $\bar{q}(x)$ must be expandable in a Taylor's series over the entire length of the nozzle. This is equivalent to requiring the limit

$$\lim_{\xi \to 0} \frac{(d\bar{h})/(d\xi)}{(\bar{M}^2 - 1)} \tag{4:04}$$

to exist. The expansion of $\bar{h}(\xi)$ in a Taylor's series about the origin must therefore be of the form

$$\bar{h}(\xi) = 1 + k\xi^2 + \text{higher order terms} \quad (k > 0) \tag{4:05}$$

These statements are equivalent and ensure a unique solution to the problem. Eq. (4:05) shows that a choice of $\bar{h}(\xi)$ which satisfies the uniqueness condition also satisfies the physical requirements at the throat, i.e.,

$$\bar{h}(0) = 1$$

$$\frac{d\bar{h}(0)}{d\xi} = 0 \tag{4:06}$$

$$\frac{d^2\bar{h}(0)}{d\xi^2} > 0$$

The requirement that the exhaust flow be uniform implies that the function $\bar{h}(\xi)$ must be constant for $\xi > \xi_d$, the subscript $(\ )_d$ referring to the design value at which the desired Mach number is reached first. Hence, no single continuous function can result in a finite nozzle, for, as will be shown later, the coordinates depend upon the continuity of h and all its derivatives. Since the series will be cut off after a few terms, say n, the approximation depends upon continuous derivatives of the (n - 2) order. It is possible then, in principle, to evolve a nozzle whose coordinates may be found approximately over its entire length by means of a single computational technique. A more attractive alternative possibility consists of choosing an $\bar{h}(\xi)$ which is asymptotic in nature and allows the flow to become nearly uniform within a finite length. Such a choice will be considered later.

To avoid the asymptotic approach to uniform flow, one may make use of the properties of real characteristics. The function $\bar{h}(\xi)$ is used to define a flow upstream of the design characteristic line (PI in Fig. 1), which passes through the point (P) on the $\eta = 0$ axis at which $M = M_d$. The downstream flow field may then be patched along the characteristic in such a way that the flow properties, but not necessarily their derivatives, are continuous across the cut.

This is accomplished by noting that the region PIQ (Fig. 1) is a simple wave region. Consequently, the characteristics (e.g., ab) are straight Mach lines and so have constant flow properties along their entire length. Equating the mass flow across Ia to that across ab establishes the length ab.

As presently outlined, the method applies to either axially symmetric or two-dimensional geometries. However, there seems to be no real restriction placed upon the cross section, if the added complexity is of no consequence. For geometrically similar sections (e.g., elliptic), it would appear that the above procedure could be generalized to include the additional effect. In the latter cases, the coordinate system normal to the flow should be chosen so that one of the coordinate surfaces has the same shape as the desired nozzle cross-section.

4.2 Design Equations

In carrying out the design computations it is convenient to consider

three major divisions of effort:

1. The contour upstream of the inflection point, I.
2. The design characteristic, PI.
3. The simple wave-region contour, IQ.

Upstream of the inflection point the flow properties are assumed in the series form:

$$x = \xi + x_2(\xi)\eta^2 + x_4(\xi)\eta^4 + \ldots. \qquad (4:07)$$

$$y = y_1(\xi)\eta + y_3(\xi)\eta^3 + y_5(\xi)\eta^5 + \ldots. \qquad (4:08)$$

$$\theta = \theta_1(\xi)\eta + \theta_3(\xi)\eta^3 + \theta_5(\xi)\eta^5 + \ldots. \qquad (4:09)$$

$$\frac{q}{\bar{q}} = 1 + \delta_2(\xi)\eta^2 + \delta_4(\xi)\eta^4 + \ldots. \qquad (4:10)$$

and the analysis indicated in Appendix I yields the following values for the coefficients x_i, y_i, θ_i, and δ_i, the primes being used to denote derivatives with respect to ξ. For the axially symmetric case:

$$y_1 = \bar{h}$$

$$y_3 = \frac{\bar{h}}{8}\left[(\bar{M}^2 - 1)\,\bar{h}'\bar{h}'' - \bar{h}^2\right]$$

$$x_2 = -\frac{1}{2}\bar{h}\bar{h}'$$

$$x_4 = -\frac{\bar{h}^2}{32}\left\{\bar{h}'\bar{h}''\left[5(\bar{M}^2 - 1) + 2 + \frac{(\gamma - 1)\bar{M}^2 + 2}{\bar{M}^2 - 1}\right] + (\bar{M}^2 - 1)\bar{h}\bar{h}'''\right\} \qquad (4:11)$$

$$\theta_1 = \bar{h}'$$

$$\delta_2 = \frac{1}{2}\bar{h}\bar{h}''$$

and for the two-dimensional case (to a higher order of approximation):

$$x_2 = -\frac{1}{2}\bar{h}\bar{h}''$$

$$x_4 = -\frac{\bar{h}}{24}\left\{\bar{h}^2\bar{h}'\,(\bar{M}^2 - 1) - (\bar{h}')^3 + \bar{h}\bar{h}'\bar{h}''\left[\frac{(\gamma + 4)\bar{M}^4 - 7\bar{M}^2 + 4}{\bar{M} - 1}\right]\right\} \qquad (4:12)$$

$$y_1 = \bar{h}$$

$$y_3 = \frac{\bar{h}}{6}\left[(\bar{M}^2 - 1)\bar{h}\bar{h}'' - (\bar{h}')^2\right] \tag{4:13}$$

$$y_5 = \frac{\bar{h}}{5}\left\{\frac{(\bar{h}\bar{h}'')^2}{4}\left(\frac{\gamma}{2}\bar{M}^4 - \frac{1}{2}\bar{M}^2 + 1\right) + (\bar{M}^2 - 1)\left(\delta_4 - \frac{1}{4}\bar{h}\bar{h}''(\bar{h}')^2\right) + \frac{(\bar{h}')^4}{24} - \frac{\bar{h}\bar{h}'}{6}\left[\bar{h}'\bar{h}''\left(\frac{(\gamma+1)\bar{M}^4}{\bar{M}^2 - 1} - 1\right) + \bar{h}\bar{h}'''\left(\bar{M}^2 - 1\right)\right]\right\}$$

$$\delta_2 = \frac{1}{2}\bar{h}\bar{h}''$$

$$\delta_4 = \frac{1}{8}\left\{(\bar{h}\bar{h}'')^2(\bar{M}^2 + 1) + \frac{\bar{h}}{3}\left[\left(\frac{(\gamma+1)\bar{M}^4}{\bar{M}^2 - 1} - 1\right)\left(\bar{h}'^2\bar{h}'' + \bar{h}\left[\bar{h}''^2 + \bar{h}'\bar{h}'''\right]\right) + \bar{h}(\bar{M}^2 - 1)(2\bar{h}'\bar{h}''' + \bar{h}\bar{h}'''') + \bar{M}^2\bar{h}'\left(\frac{(\gamma-1)\bar{M}^2 + 2}{\bar{M}^2 - 1}\right)\left(\bar{h}\bar{h}''' + \frac{\bar{h}'\bar{h}''(\gamma+1)\bar{M}^2(\bar{M}^2 - 2)}{(\bar{M}^2 - 1)^2}\right)\right]\right\} \tag{4:14}$$

$$\theta_1 = \bar{h}'$$

$$\theta_3 = \frac{\bar{h}}{6}\left[\bar{h}'\bar{h}''\left(\frac{(\gamma+1)\bar{M}^4}{\bar{M}^2 - 1} - 1\right) + \bar{h}\bar{h}'''(\bar{M}^2 - 1)\right]$$

$$\theta_5 = \frac{1}{5}\left[\bar{h}'\left\{\delta_2 + \left[\frac{\bar{h}\bar{h}''}{2}\right]^2\left[\left(\frac{\gamma}{2}\bar{M}^4 - \frac{\bar{M}^2}{2} + 1\right) + \delta_4(\bar{M}^2 - 1)\right]\right\} + \bar{h}\left\{\frac{\bar{h}''}{2}\left[(\bar{M}^2 - 1)\left(\frac{1}{2}\bar{h}\bar{h}'\bar{h}'' + \bar{h}\delta_2'\right) + \bar{h}^2\bar{h}''\bar{M}\bar{M}'\right] + 2\delta_2\left[\delta_2'\left(\frac{\gamma}{2}\bar{M}^4 - \frac{\bar{M}^2}{2} + 1\right) + \delta_2\left(\gamma\bar{M}^2 - \frac{1}{2}\right)\bar{M}\bar{M}'\right]\right\} + \delta_4'(\bar{M}^2 - 1) + 2\delta_4\bar{M}\bar{M}'\right] \tag{4:15}$$

With the aid of Eqs. (4:07) through (4:15) the flow properties of interest to the designer are defined upstream of the design characteristic, PI (Fig. 1), and in particular along the design streamline $\eta = \eta_d$ = constant. In order to compute the contour IP, it is first necessary to find the coordinates and properties along the design characteristic. As shown in Appendix I, the slope of the characteristic in the (ξ, η) plane is of the form

$$\frac{d\eta}{d\xi} = F(\xi) + G(\xi)\eta^2 + H(\xi)\eta^4 + \ldots . \tag{4:16}$$

where

$$F(\xi) = -\frac{1}{\bar{h}\sqrt{\overline{M}^2 - 1}}$$

$$G(\xi) = \frac{\bar{h}''(\gamma + 1)\overline{M}^4}{4(\overline{M}^2 - 1)^{3/2}}$$

$$\begin{aligned} H(\xi) = F(\xi)\Bigg[\frac{1}{y_1}\Bigg\{&\frac{f(\overline{M})}{2}\Big[\delta_2(1 + 3y_3 - 2x_2\theta_1) - \delta_4\Big] - 5y_5 - 4x_4\theta_1 \\ &- 2x_2\left(\theta_3 + \frac{\theta_1^3}{3}\right) - (x_2' + \theta_1 y_1')(3y_3 - 2x_2\theta_1) \\ &+ \frac{1}{y_1}(3y_3 - 2x_2\theta_1)\Bigg\} + \frac{\delta_2}{2}\Big[\delta_2 g(\overline{M}) - f(\overline{M})(x_2' + \theta_1 y_1')\Big] \\ &+ x_4' + \theta_1 y_3' + y_1'\left(\theta_3 + \frac{\theta_1^3}{3}\right)\Bigg] \end{aligned} \tag{4:17}$$

and

$$f(\overline{M}) = \frac{\overline{M}^2}{\overline{M}^2 - 1}\Big[(\gamma - 1)\overline{M}^2 + 2\Big]$$

$$g(\overline{M}) = f(\overline{M})\left[(\gamma - 1)\overline{M}^2 + \frac{1}{2} - \frac{f(\overline{M})}{4}\right]$$

Numerical integration of Eq. (4:16) starting at the point $(\xi, \eta) = (\xi_d, 0)$, (i.e., point P), determines the coordinates (ξ, η) of the design characteristic. The Runge-Kutta method[30] is convenient for this procedure. On this basis the fourth order approximation to $\Delta\eta$ for a given increment $\Delta\xi$ is

$$\Delta\eta = \frac{1}{6}(K_1 + 2K_2 + 2K_3 + K_4) \qquad (4:18)$$

where

$$K_1 = \left[F(\xi) + G(\xi)\eta^2 + H(\xi)\eta^4\right]\Delta\xi$$

$$K_2 = \left[F\left(\xi + \frac{\Delta\xi}{2}\right) + G\left(\xi + \frac{\Delta\xi}{2}\right)\left(\eta + \frac{K_1}{2}\right)^2 + H\left(\xi + \frac{\Delta\xi}{2}\right)\left(\eta + \frac{K_1}{2}\right)^4\right]\Delta\xi$$

$$(4:19)$$

$$K_3 = F\left[\left(\xi + \frac{\Delta\xi}{2}\right) + G\left(\xi + \frac{\Delta\xi}{2}\right)\left(\eta + \frac{K_2}{2}\right)^2 + H\left(\xi + \frac{\Delta\xi}{2}\right)\left(\eta + \frac{K_2}{2}\right)^4\right]\Delta\xi$$

$$K_4 = \left[F(\xi + \Delta\xi) + G(\xi + \Delta\xi)(\eta + K_3)^2 + H(\xi + \Delta\xi)(\eta + K_3)^4\right]\Delta\xi$$

Upon extension of the characteristic coordinates to a point at which $\eta > \eta_d$ the coordinate pairs (ξ, η) may be substituted into Eqs. (4:07) through (4:10) to find the associated properties.

The coordinates of the contour segment IQ follow finally from

$$x_b = x_a + \frac{(\eta_d - \eta_a)\cos(\theta_a + \alpha_a)}{\left(\frac{\gamma+1}{2} - \frac{\gamma-1}{2} M^{*2}\right)^{(\gamma+1)/2(\gamma-1)}}$$

$$(4:20)$$

$$y_b = y_a + \frac{(\eta_d - \eta_a)\sin(\theta_a + \alpha_a)}{\left(\frac{\gamma+1}{2} - \frac{\gamma-1}{2} M^{*2}\right)^{(\gamma+1)/2(\gamma-1)}}$$

Points a and b refer to the end points of the straight characteristics in the simple wave region PIQ (Fig. 1). The Mach number referenced to the speed of sound at the throat is found from

$$M^{*2} = \overline{M}^{*2}\left[1 + 2\delta_2\eta^2 + (2\delta_4 + \delta_2^2)\eta^4\right] \qquad (4:21)$$

where

$$\overline{M}^{*2} = \frac{6\overline{M}^2}{\overline{M}^2 + 5} \qquad (4:22)$$

and the Mach angle, α, is given by

$$\alpha = \sin^{-1}\left(\frac{1}{M}\right) = \frac{1}{2}\cos^{-1}\left\{1 - 2\left[\frac{(\gamma+1) - (\gamma-1)M^{*2}}{2M^{*2}}\right]\right\} \tag{4:23}$$

4.3 Basis For Tabulated Functions

The nozzle generating function used in the design of the nozzles for the Naval Supersonic Laboratory is

$$\bar{h} = 1 + \xi^2 \quad . \tag{4:24}$$

All derivatives of $\bar{h}$ greater than the second order thereby vanish, which simplifies the computations and reduces the effort required to establish specific coefficients for the higher-order terms in Eqs. (4:07) through (4:10).

For convenience introduce the abbreviations:

$$\begin{aligned}
A &= \bar{M}^2 - 1 \\
B &= \gamma\bar{M}^4 - \bar{M}^2 + 2 \\
C &= \frac{(\gamma+1)\bar{M}^4}{\bar{M}^2 - 1} - 1 \\
D &= \frac{(\gamma-1)\bar{M}^2 + 2}{\bar{M}^2 - 1} \\
L &= 3y_3 - 2x_2\theta_1 \\
E &= \frac{L}{y_1} + \frac{y_1}{2}D(A+1)
\end{aligned} \tag{4:25}$$

The corresponding derivatives are found to be

$$\begin{aligned}
A' &= D(A+1)\frac{\theta_1}{y_1} \\
B' &= A'\left[2\gamma(A+1) - 1\right] \\
C' &= (\gamma+1)A'\left(\frac{A^2-1}{A^2}\right)
\end{aligned} \tag{4:26}$$

and

$$D' = -(\gamma + 1)\frac{A'}{A^2}$$

Now, assuming the nozzle generating function given by Eq. (4:24), and using the above notation, the coefficients x_i, y_i, etc., reduce to:

$$x_2 = -\frac{1}{2}\theta_1 y_1$$

$$x_4 = \frac{x_2}{6}\left[y_1\left(\frac{B}{A} + 4A\right) + 2\right] \tag{4:27}$$

$$y_1 = 1 + \xi^2 \tag{4:28}$$

$$y_3 = \frac{y_1}{3}\left[y_1(A-2) + 2\right]$$

$$y_5 = \frac{y_1}{5}\left\{y_1^2\left[\frac{B}{2} - 2A + \frac{2}{3}(1-2C)\right] + 2y_1\left[A + \frac{2}{3}(C-1)\right] + A\delta_4 + \frac{2}{3}\right\}$$

$$\theta = 2\xi$$

$$\theta_3 = \frac{1}{3}\theta_1 y_1 C \tag{4:29}$$

$$\theta_5 = \frac{1}{5}\left\{\theta_1 y_1^2\left[2A + \frac{3}{2}B + D(A+1)(\gamma[A+1] + \frac{1}{2})\right] + \theta_1\delta_4(A+1)(D+1) + Ay_1\delta_4'\right\}$$

$$\delta_2 = y_1$$

$$\delta_4 = \frac{y_1}{6}\left[3y_1(A + C + 2) - 2C + \frac{(y_1 - 1)}{A}(2D)(C+1)(A-1)\right] \tag{4:30}$$

Similarly, Eqs. (4:17) become

$$F(\xi) = -\left(y_1 A\right)^{\frac{1}{2}-1}$$

$$G(\xi) = \frac{C+1}{2A^{\frac{1}{2}}} \tag{4:31}$$

$$H(\xi) = F(\xi)\left\{x_4' + \theta_1 y_3' + E(E + 2 - y_1) + \frac{4\theta_1 x_4 - 5y_5}{y_1} - D(A+1)\left[\frac{L + \delta_4}{2} + \frac{y_1^2}{8}\left\{2 + (A+1)\left[4(\gamma-1) - D\right]\right\}\right]\right\}$$

Some derivatives required above are given by

$$y_3' = \frac{\theta_1 y_3}{y_1} + \frac{y_1}{3}\left[\theta_1(A-2) + y_1 A'\right]$$

$$x_4' = \frac{x_4}{x_2}(2 - 3y_1) + \frac{x_2\theta_1}{6}\left(\frac{B}{A} + 4A\right) + y_1\left(\frac{AB' - BA'}{A^2} + 4A'\right)$$

$$\delta_4' = \frac{\theta_1\delta_4}{y_1} + \frac{y_1}{6}\left\{\theta_1\left[3(A + C + 2) + \frac{2D(C+1)(A-1)}{A}\right] + 2(y_1 - 1)\left[\frac{D}{A}\left\{C'(A-1) + A'(C+1)\right\} + \left\{\frac{(C+1)(A-1)}{A^2}\right\}\left\{AD' - DA'\right\}\right] + 3y_1A' + C'(3y_1 - 2)\right\} \tag{4:32}$$

Eqs. (4:27) through (4:32) have been evaluated and appear as Tables 3, 4, and 5. The mechanics of nozzle design are considerably reduced with the aid of these tables. The coordinates for the contour upstream of the inflection point are now given by the simple operations indicated in Eqs. (4:07) and (4:08) with $\eta = \eta_d$. Although a numerical integration is still necessary to establish the design characteristic line, the K_i of Eq. (4:19) are obtained easily using Table 4. Finally, the parameters required by Eq. (4:20) for the downstream contour may be found by application of Eqs. (4:07) through (4:09).

Fig. 2 illustrates a few of the resulting streamlines and backward running characteristics of the field. The coordinates for these lines are listed in Tables 1 and 2 and have been used for nozzles now in operation at this Laboratory after applying a correction for viscous effects. Complete potential-flow nozzle contours are shown in Fig. 3, and the corresponding coordinates are listed in Table 1.*

Figs. 4 through 8 illustrate the relative magnitude of contribution for each term in the assumed power-series forms for x, y, θ, $q/\bar{q}$, and $d\eta/d\xi$. Successive coefficients are plotted at reduced orders of magnitude to aid

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*See Index To Tables, page 165. Note that coordinate upstream of inflection point are applicable for any M_d.

the visual interpretation; for example, in Fig. 4 there appears $x_0 (=\xi)$, $0.01x_2$, and $0.0001 x_4$ corresponding to $\eta = 0.1$. Although the third term in the series appears to increase rapidly as ξ increases, it should be noted that the design characteristic slants back sharply at high Mach numbers. Therefore, in practice, $\eta \rightarrow 0$ as ξ increases and the relative magnitudes in the vicinity of $\xi = 3$ must be considered with this in mind. Even for $M_d = 3.5$, the design characteristic intersects the contour $(\eta = \eta_d)$ as far upstream as $\xi = 1.0$ (see Fig. 11).

The series do appear to converge rapidly. Further remarks on the regions of convergence are made in the next section.

4.4 Contour Slope and Curvature

A fundamental check on the accuracy of the computations can be made by comparison of the analytically derived slope and the same quantity obtained by means of finite differences from the final (x, y) values. Certainly one must insure before fabrication, that the continuity and smoothness of the design curve is equal to or better than the available machining tolerances. Therefore, it is necessary to compute the first and second derivative variations along the contour and make use of this information in the final design specifications.

Upstream of the inflection point these derivatives are given by

$$\frac{dy}{dx} = \tan \theta \qquad (4:33)$$

$$\frac{d^2y}{dx^2} = \frac{1}{\cos^2 \theta} \frac{d\theta}{dx} \qquad (4:34)$$

in which η is assumed constant. Here

$$\frac{d\theta}{dx} = (\theta_1{}'\eta + \theta_3{}'\eta^3 + \theta_5{}'\eta^5) \frac{d\xi}{dx}$$

and for the assumed $\bar{h}$ (Eq. (4:24)):

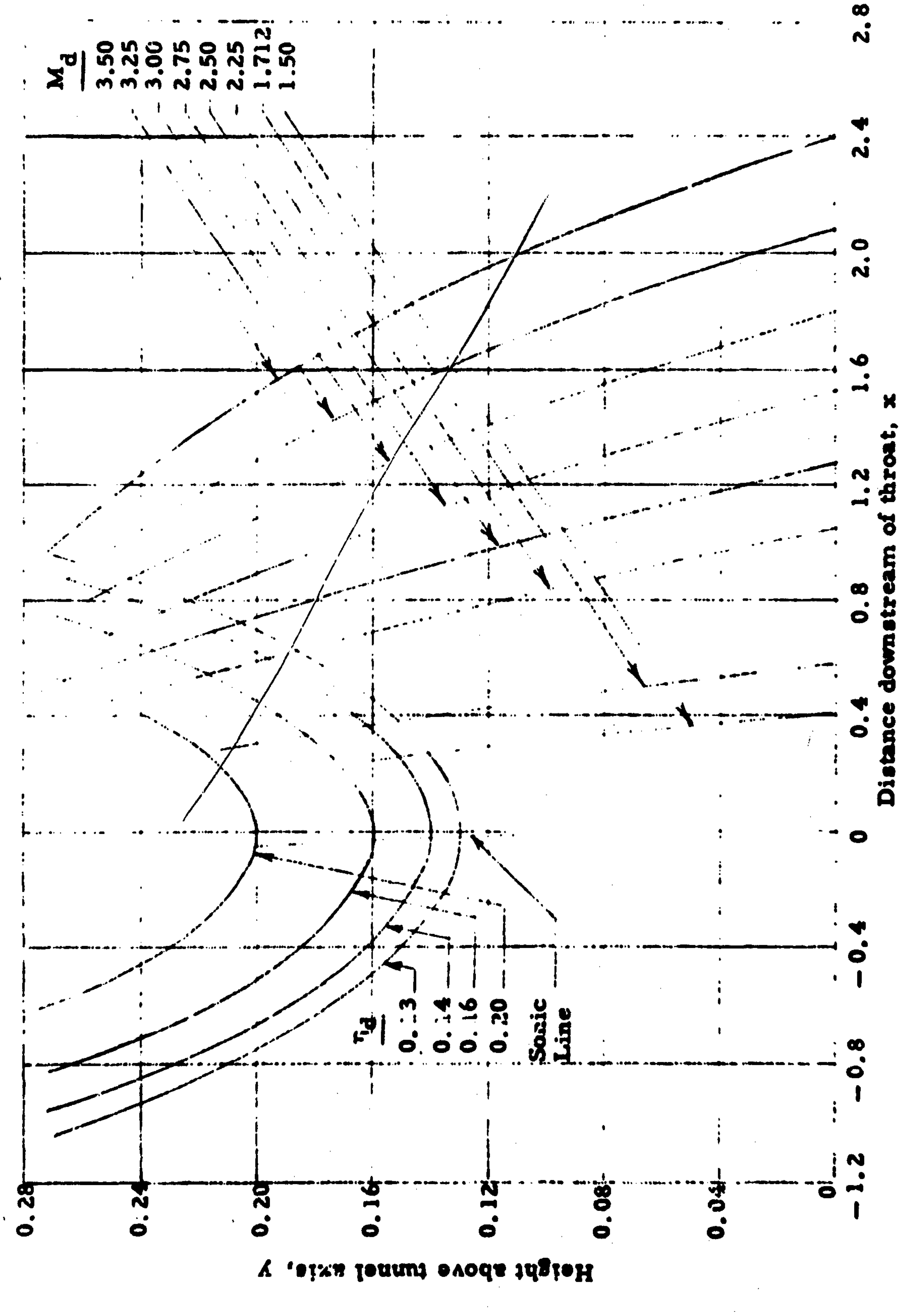

Fig. 2 Streamlines and design characteristics

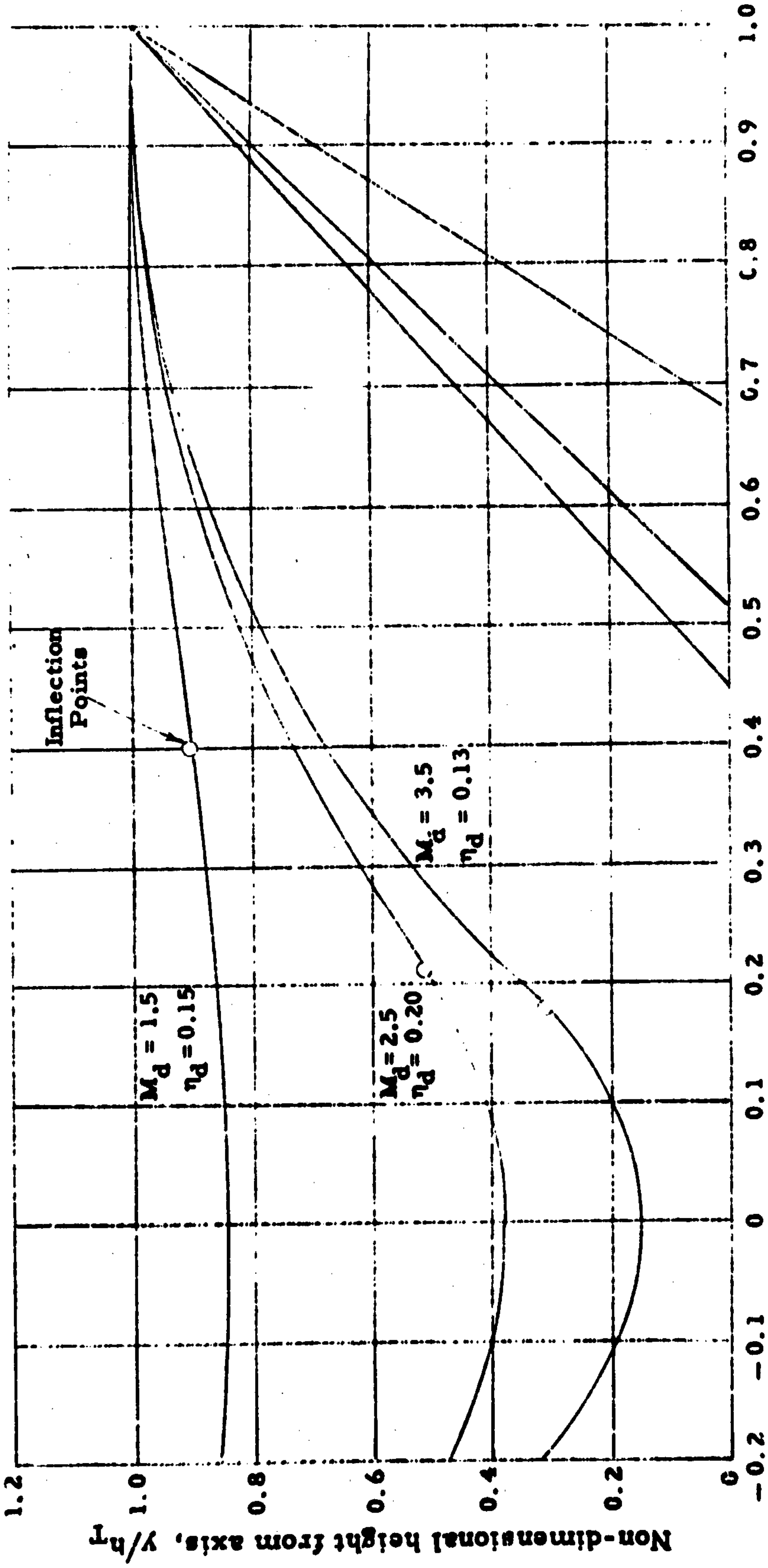

Fig. 3 Potential-flow nozzle contours

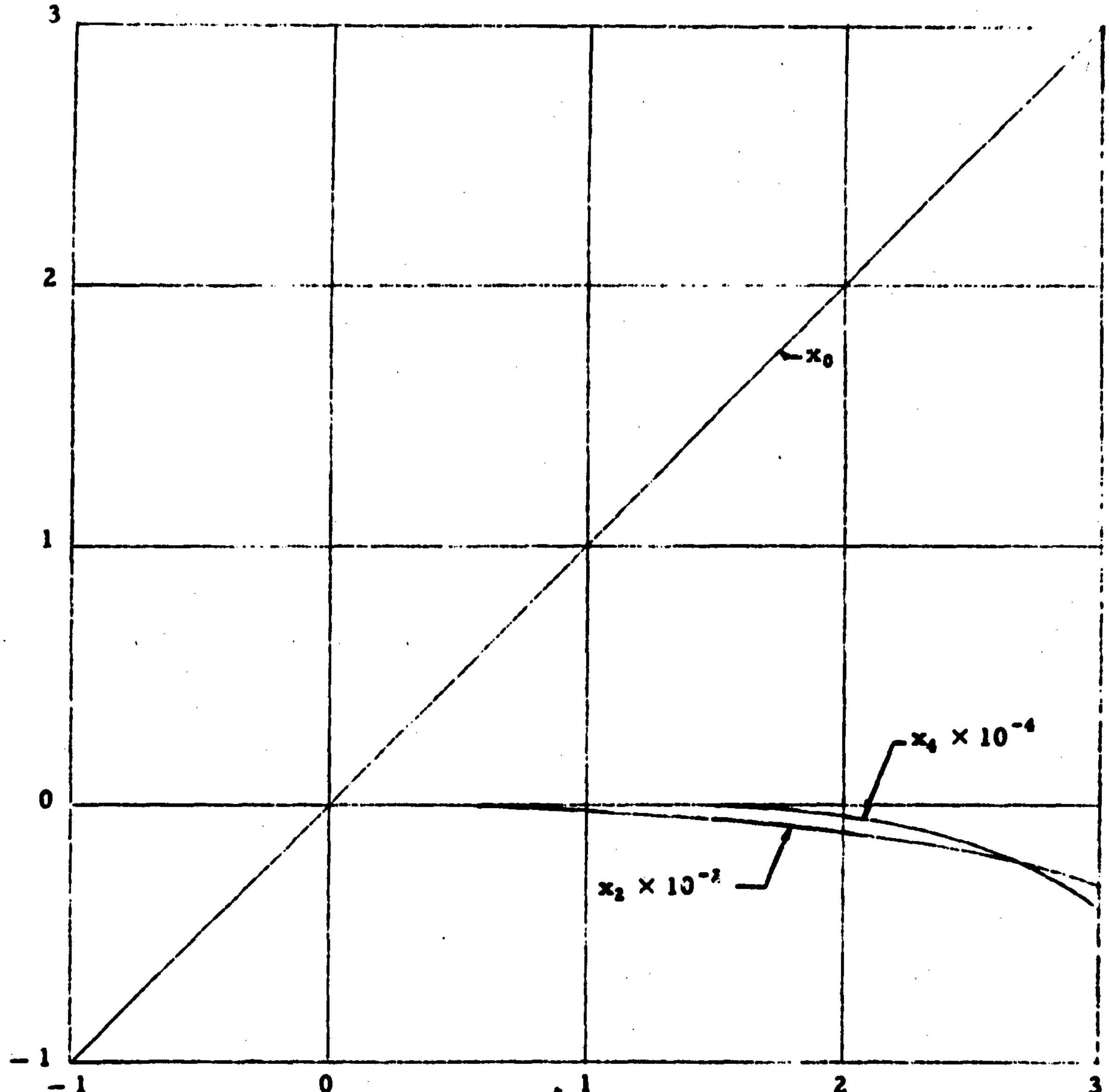

Fig. 4 Coefficients in series expansion for x
(From Table 3; $\bar{h} = 1 + \xi^2$)

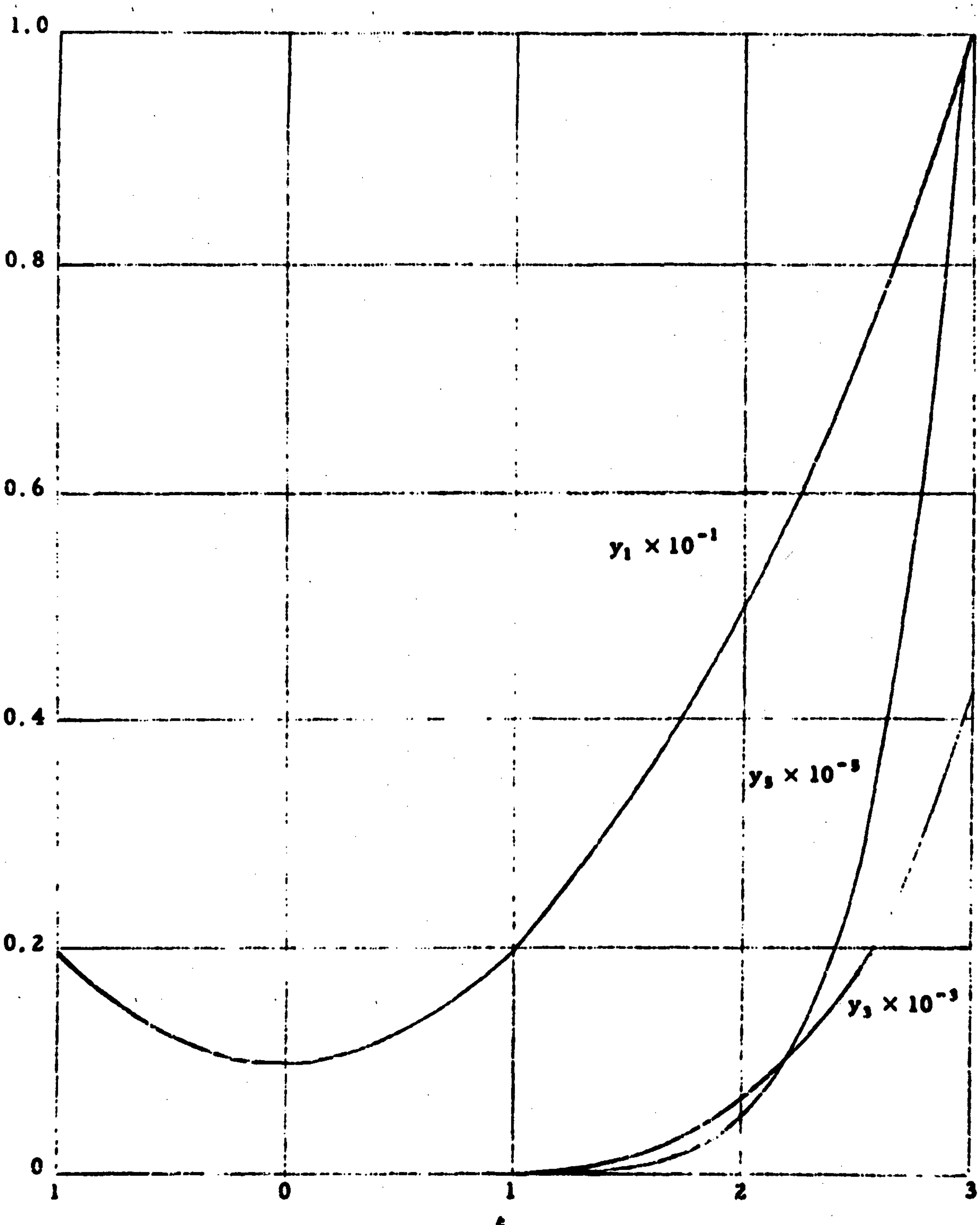

Fig. 5 Coefficients in series expansion for y
(From Table 3; $\bar{h} = 1 + \xi^2$)

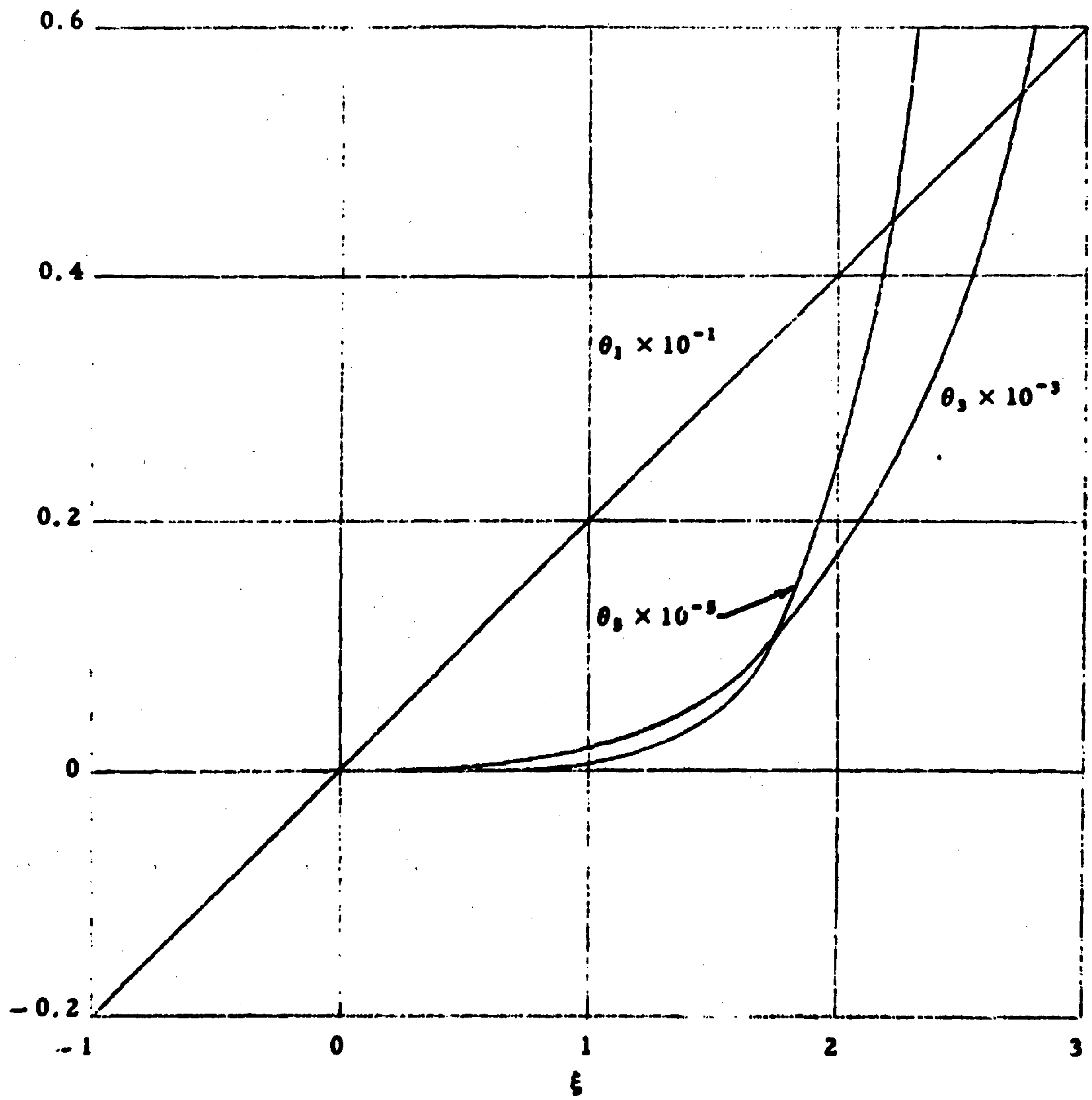

Fig. 6 Coefficients in expansion series for θ
(From Table 3; $\bar{h} = 1 + \xi^2$)

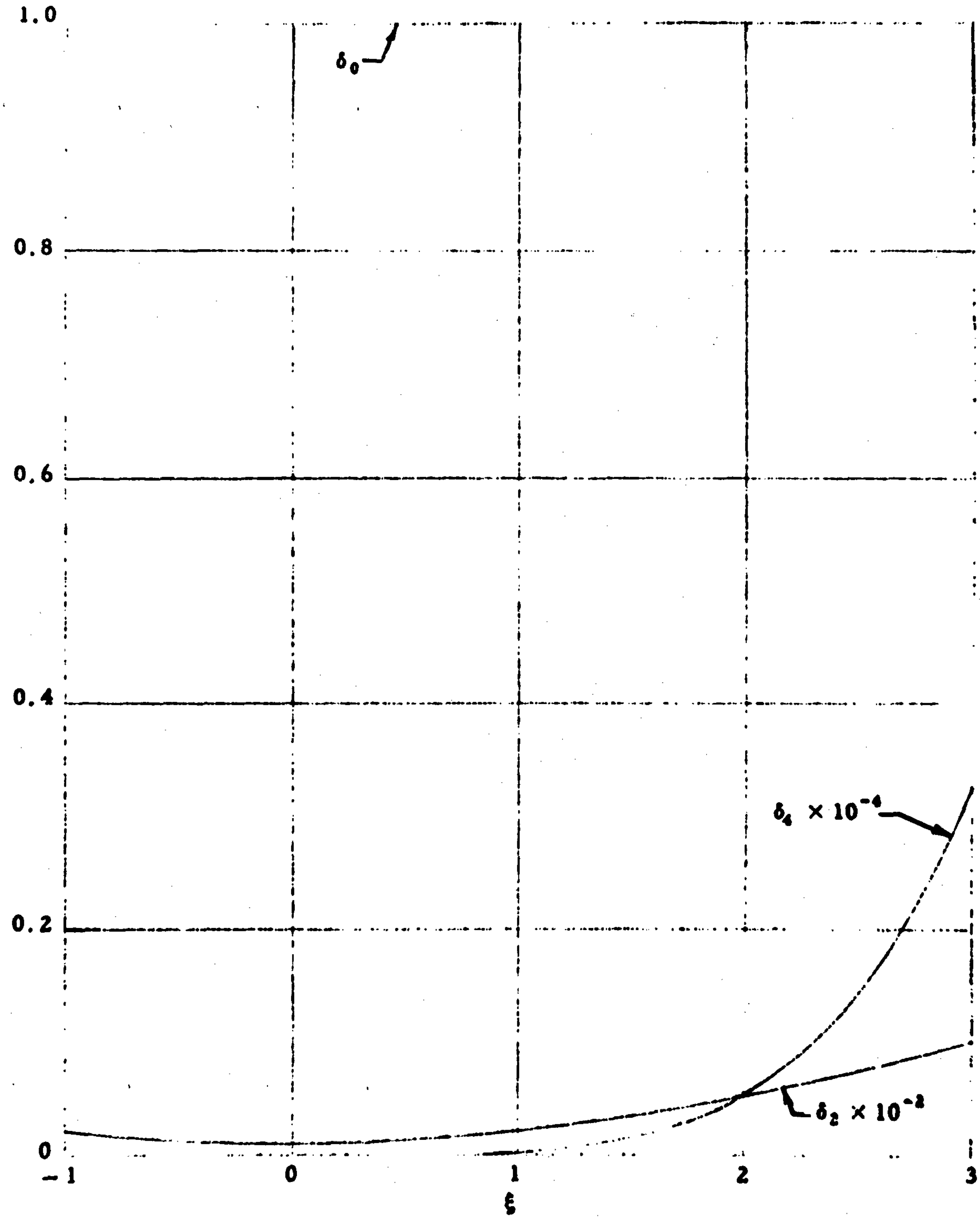

Fig. 7 Coefficients in series expansion for $q/\bar{q}$
(From Table 3; $\bar{h} = 1 + \xi^2$)

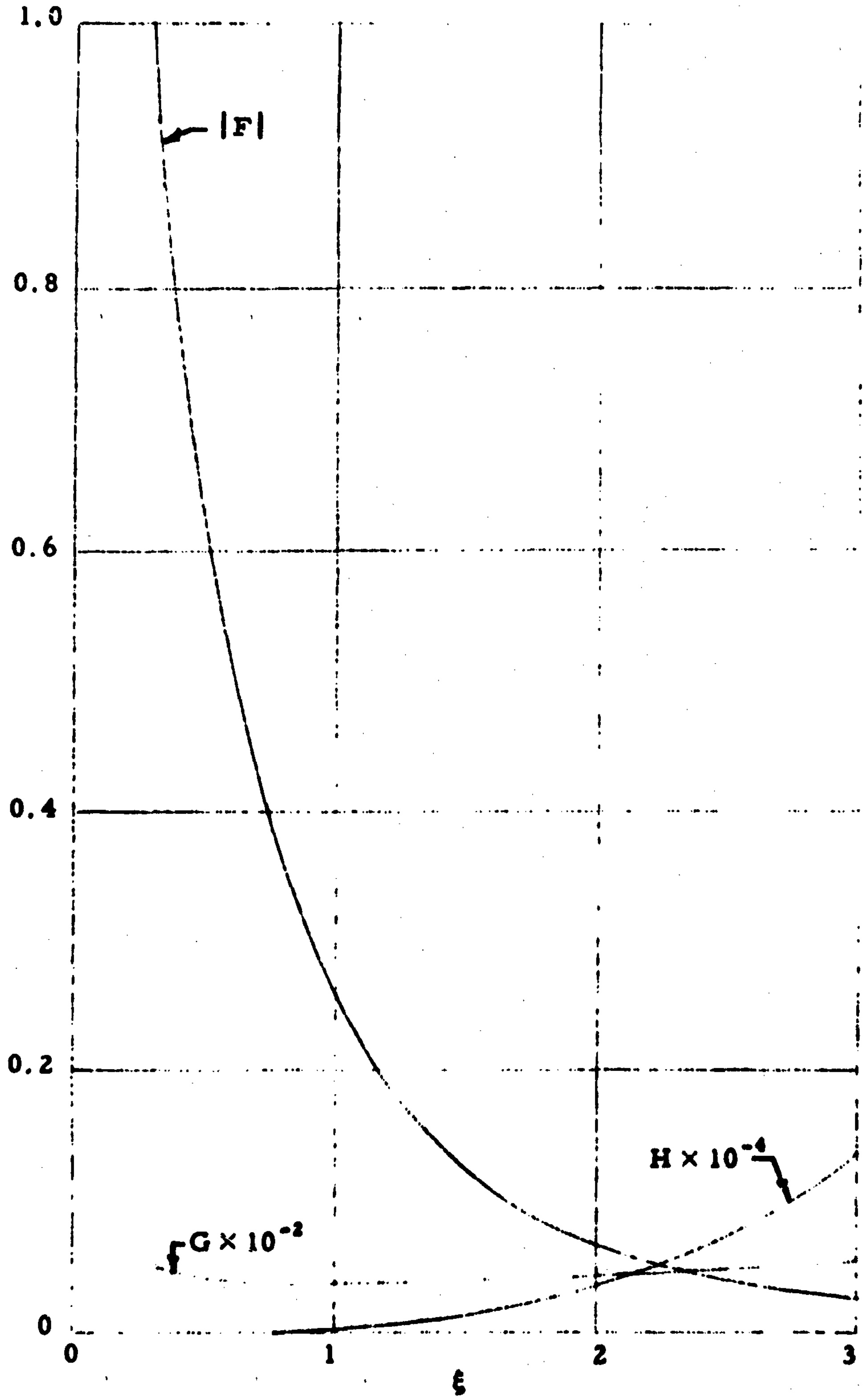

Fig. 8 Coefficients in series expansion for $d\eta/d\xi$
(From Table 4; $\bar{h} = 1 + \xi^4$)

$$\theta_1' = 2$$

$$\theta_3' = \frac{1}{3}\left[2C(3y_1 - 2) + \theta_1 y_1 C'\right]$$

$$\theta_5' = \frac{1}{5}\left\{2y_1(5y_1 - 4)\left[2A + \frac{3}{2}B + D\overline{M}^2\left(\gamma\overline{M}^2 + \frac{1}{2}\right)\right] + \theta_1 y_1^2\left[2A' + \frac{3}{2}B' + \gamma DA'\overline{M}^2 + \left(\gamma\overline{M}^2 + \frac{1}{2}\right)(DA' + D'\overline{M}^2)\right]\right.$$
$$\left. + \delta_4\left[2\overline{M}^2(D+1) + \theta_1\left\{A'(D+1) + D'\overline{M}^2\right\}\right] + \delta_4'\left[\theta_1\left\{\overline{M}^2(D+2) - 1\right\} + y_1 A'\right] + \delta_4'' A y_1\right\} \tag{4:36}$$

Furthermore:

$$\frac{d\xi}{dx} = \left(1 + (2 - 3y_1)\eta^2 + x_4'\eta^4\right)^{-1} \tag{4:37}$$

and

$$\delta_4'' = \frac{2}{y_1^2}\left[y_1(\theta_1\delta_4' + 2\delta_4) - \eta^2\delta_4\right] + \frac{y_1}{6}\left[\frac{2}{A}\{3A(A + C + 2) + 2D(C+1)(A-1)\} + 3y_1(A'' + C'') - 2C''\right.$$
$$+ 2\frac{\theta_1}{A^2}\{3A^2(A' + C') + 2AD[C'(A-1) + A'(C+1)] + 2(C+1)(A-1)(AD' - DA')\}$$
$$+ 2\frac{(y_1 - 1)}{A^2}\{AD[C''(A-1) + 2C'A' + A''(C+1)] + 2(D'A - A'D)[C'(A-1)$$
$$\left. + \frac{A'}{A}(C+1)] + (D''A - DA'')[(C+1)(A-1)]\}\right] \tag{4:38}$$

The functions of $\overline{M}$ that are present reduce to

$$A'' = \frac{1}{y_1}\left[\theta_1\{A'(D-1) + D'\overline{M}^2\} + 2D\overline{M}^2\right]$$

$$C'' = (\gamma + 1)A'' + D'' \tag{4:39}$$

$$D'' = \left(\frac{\gamma + 1}{A^3}\right)(2A'^2 - AA'')$$

Making use of Table 5, the quantities $d\xi/dx$ and $d\theta/dx$ may be determined rapidly and the desired derivatives follow from Eqs. (4:33) and (4:34).

Downstream of the inflection point it is necessary to interpret the streamline derivatives in terms of properties along the design characteristic. In this case

$$\left(\frac{dy}{dx}\right)_b = \tan\theta_b = \tan\theta_a \tag{4:40}$$

$$\left(\frac{d^2 y}{dx^2}\right)_b = \frac{1}{\cos^2\theta_a}\,\frac{d\theta_a}{dx_a}\,\frac{dx_a}{dx_b} \tag{4:41}$$

where θ_a is already known from prior needs. Dropping the subscript "a" for convenience and using subscripts to denote partial integration:

$$\frac{d\theta}{dx} = \theta_x + \theta_y y_x = (\theta_\eta \eta_x + \theta_\xi \xi_x) + (\theta_\eta \eta_y + \theta_\xi \xi_y)\,[\tan(\theta - \alpha)] \tag{4:42}$$

in which

$$\begin{aligned} \theta_\xi &= \theta_1'\eta + \theta_3'\eta^3 + \theta_5'\eta^5 \\ \theta_\eta &= \theta_1 + 3\theta_3\eta^2 + 5\theta_5\eta^4 \end{aligned} \tag{4:43}$$

and

$$\begin{aligned} \xi_x &= \frac{y_\eta}{J} \quad ; \quad \eta_x = -\frac{y_\xi}{J} \\ \xi_y &= -\frac{x_\eta}{J} \quad ; \quad \eta_y = \frac{x_\xi}{J} \end{aligned} \tag{4:44}$$

$$J = \text{Jacobian} = (x_\xi y_\eta - x_\eta y_\xi)$$

The variation of the x coordinate on the contour with the corresponding x coordinate on th design characteristic is given by

$$\frac{dx}{dx_b} = \left[1 - (y_b - y_a)\frac{d(\theta + \alpha)}{dx} + \cos(\theta + \alpha)\frac{dT}{dx}\right]^{-1} \tag{4:45}$$

wherein

$$\frac{d\alpha}{dx} = -\frac{\gamma + 1}{M^{*3}\sin 2\alpha}\frac{dM^*}{dx}$$

$$\frac{dM^*}{dx} = \left\{(q/\bar{q}\left[\overline{M}^*_x + \overline{M}^*_y\tan(\theta - \alpha)\right] + \overline{M}^*\left[(q/\bar{q})_x + (q/\bar{q})_y\tan(\theta - \alpha)\right]\right\}$$

$$\frac{dT}{dx} = \frac{d\left[\dfrac{125(\eta d - \eta)}{(6 - M^{*2})^3}\right]}{dx} = \frac{(125)\left[\left(6 - M^{*2}\right)\dfrac{d\eta}{dx} - 6(\eta_d - \eta)M^*\dfrac{dM^*}{dx}\right]}{\left(6 - M^{*2}\right)^4} \tag{4:46}$$

and

$$\frac{d\eta}{dx} = \eta_x + \eta_y\tan(\theta - \alpha)$$

With the choice of Eq.(4:24) there results:

$$\overline{M}^*_x = \left(\frac{\theta_1\overline{M}^*}{y_1 A}\right)\xi_x$$
$$\overline{M}^*_y = \left(\frac{\theta_1\overline{M}^*}{y_1 A}\right)\xi_y \tag{4:47}$$

A few of the plots obtained from Eqs.(4:33), (4:34), (4:40), and (4:41), and Tables 1 and 2 are illustrated in Figs. 9 and 10. Their specific utility is discussed in a later section.

4.5 Limit Values for $\xi = 0$

When $\xi \to 0$, some of the above-mentioned relations fail in machine computation and it is necessary to resort to a limiting process. This introduces no difficulty in practice since only a finite number of coordinates need be specified. For completeness, however, we include here some of the results following from repeated application of L'Hospital's Rule:

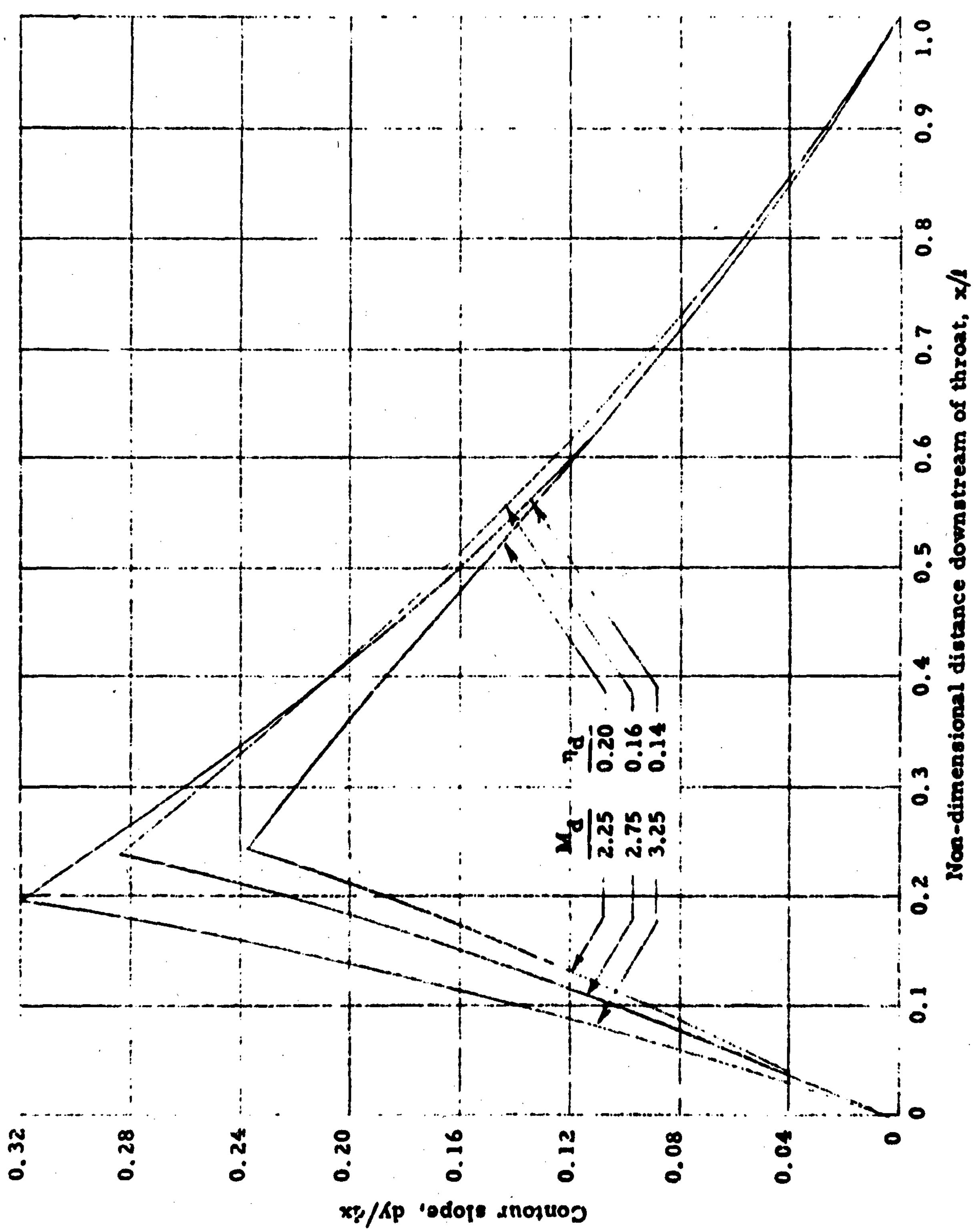

Fig. 9 Nozzle-contour slope distributions

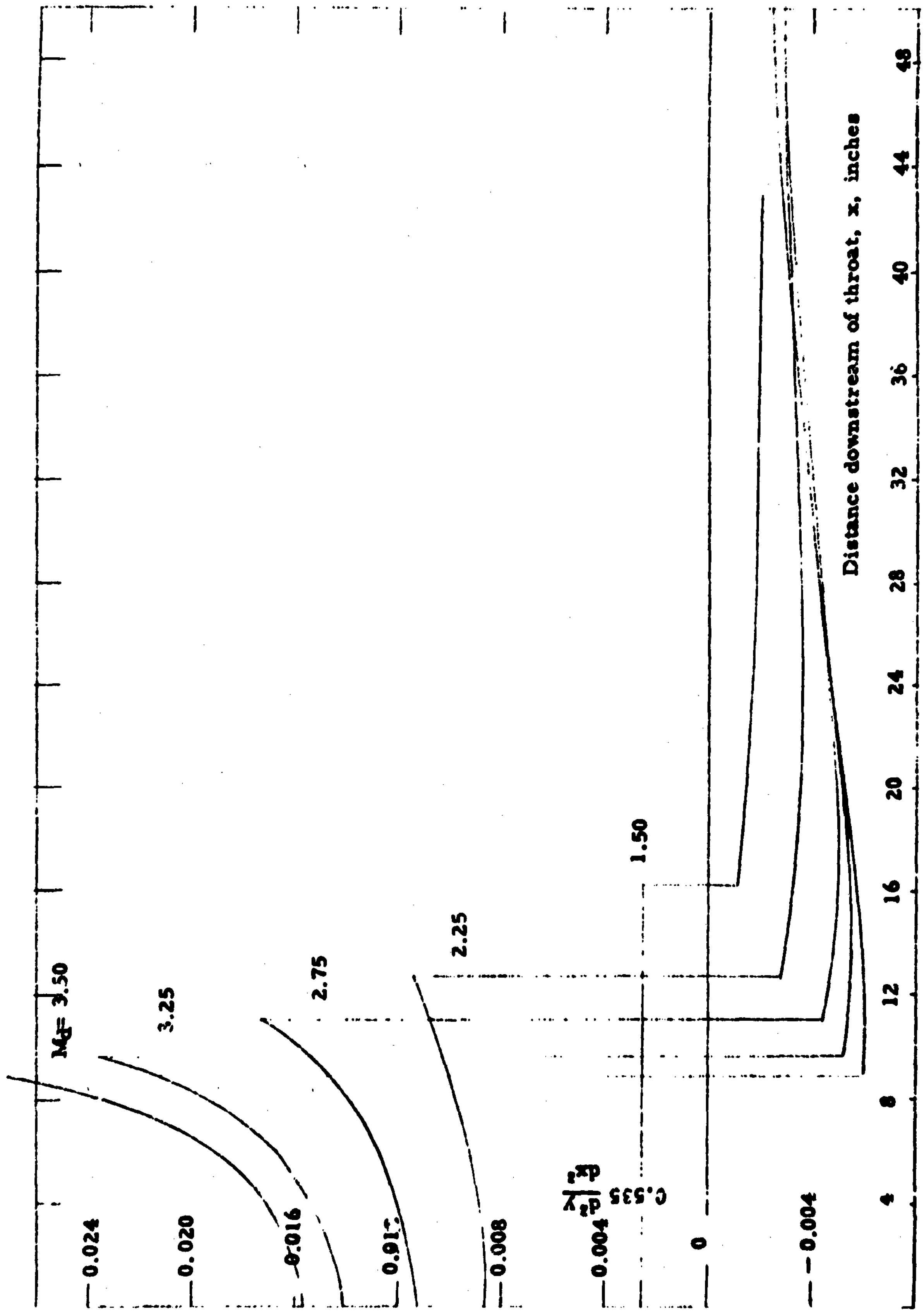

Fig. 10 Nozzle-contour d^2y/dx^2 distributions

$$\lim_{\xi \to 0} \frac{\xi}{\overline{M}^2 - 1} = (1/2)\sqrt{5/6}$$

$$\lim_{\xi \to 0} \frac{d\overline{M}}{d\xi} = \sqrt{6/5}$$

$$\lim_{\xi \to 0} \frac{d^2\overline{M}}{d\xi^2} = 2/3$$

$$\lim_{\xi \to 0} x_4 = -(1/5)\sqrt{5/6}$$

$$\lim_{\xi \to 0} \theta_3 = (4/5)\sqrt{5/6}$$

$$\lim_{\xi \to 0} \theta_5 = (608/375)\sqrt{5/6}$$

$$\lim_{\xi \to 0} y_5 = 6/25$$

$$\lim_{\xi \to 0} \delta_4 = 133/90$$

4.6 Scale Factors

The final coordinates may be scaled up or down to match the needs of a given tunnel cross section. However, the ratio of the test semi-height, h_T, to the length (L or ℓ) is dependent upon the initial choice for the design streamline, η_d. Some freedom exists in the ratio (h_T/L) in that a departure from the subsonic contour at a point far from the throat is not serious. In the supersonic regime, however, the ratio (h_T/ℓ) is fixed by $\bar{h}$ and η_d, unless one is willing to forego the aft part of the test rhombus, as in the case of high Mach number nozzles.

Assuming that the design streamline is to be extended to the entrance plane of the nozzle, and that the full test rhombus height is desirable, it is necessary to start the design with a suitable determination of η_d. The coordinates of point Q (Fig. 1) are given by Eqs. (4:20) as

$$x_Q = \xi_d + \frac{(M_d^2 + 5)\sqrt{M_d^2 - 1}}{216}\,\eta_d$$

$$y_Q = \frac{(M_d^2 + 5)}{216 M_d}\,\eta_d \tag{4:48}$$

and the scale factor, $\overline{F}$, is, therefore, given by

$$\overline{F} = \frac{h_T}{y_Q}$$

Thus, the entrance semi-height is

$$y_E = \frac{h_E y_Q}{h_T}$$

and application of Eq. (4:08) to first order determines an approximation to ξ_E. A few trials near the latter ξ_E value yield an exact result. Eq. (4:07) supplies the x_E values and finally the over-all length is

$$L(\eta) = (\overline{F})(x_Q - x_E)$$

Usually two or three trials will suffice to determine a proper value for η_d. When this is obtained, a check on its utility from the convergence viewpoint is required before proceeding. As discussed in the following section, Fig. 11 illustrates the useful design ranges for the nozzle-generating function given by Eq. (4:24).

SECTION 5

CONVERGENCE

The discussion of the Friedrichs method contains within it the implicit assumption that the assumed series are convergent. The benefits of the analytic procedure are obvious, but would, of course, be negated by a need for an excessive number of such terms in the case of slow convergence. Moreover, it is to be expected that at a sufficient distance from the nozzle axis the method will fail. Physically, the implication is that minimum lengths are associated with each exit flow.*

A consideration of the general term in the assumed velocity series is shown below to lead to a criterion for the maximum allowable departure from the nozzle centerline in the choice of η_d.

In Appendix I, Eqs. (I:08), it is shown that

$$\frac{\partial(\bar{q}/q)}{\partial\eta} = -h\frac{\delta\theta}{\partial\xi}$$

$$(\bar{q}/q)\frac{\partial\theta}{\partial\eta} = \frac{\partial h}{\partial\xi} \qquad (5:01)$$

when $\zeta = 2$. Solving for the θ derivatives and cross differentiating to eliminate θ yields

$$\frac{\partial}{\partial\xi}\left[\frac{q}{\bar{q}}\frac{\partial h}{\partial\xi}\right] = -\frac{\partial}{\partial\eta}\left[\frac{1}{h}\frac{\partial(\bar{q}/q)}{\partial\eta}\right] \qquad (5:02)$$

Now consider the series representations

$$\frac{q}{\bar{q}} = 1 + \delta_2\eta^2 + \delta_4\eta^4 + \ldots\ldots \quad \delta_{2n}\eta^{2n} + \ldots\ldots$$

$$\frac{\bar{q}}{q} = 1 + a_2\eta^2 + a_4\eta^4 + \ldots\ldots \quad a_{2n}\eta^{2n} + \ldots\ldots \qquad (5:03)$$

*There is always the possibility that too sharp an expansion angle will induce flow separation due to viscous effects. The concern at this point is primarily with a breakdown in the mathematical treatment.

and

$$\frac{h}{\bar{h}} = 1 + \alpha_2\eta^2 + \alpha_4\eta^4 + \ldots\ldots + \alpha_{2n}\eta^{2n} + \ldots\ldots$$

(5:04)

$$\frac{\bar{h}}{h} = 1 + b_2\eta^2 + b_4\eta^4 + \ldots\ldots + b_{2n}\eta^{2n} + \ldots\ldots$$

where the coefficients of the reciprocal series are related by

$$a_{2n} = -(a_{2n-2}\delta_2) - (a_{2n-4}\delta_4) - \ldots\ldots - (a_2\delta_{2n-2}) - (\delta_{2n})$$

(5:05)

$$b_{2n} = -(b_{2n-2}\alpha_2) - (b_{2n-4}\alpha_4) - \ldots\ldots - (b_2\alpha_{2n-2}) - (\alpha_{2n})$$

Substituting these values into Eq. (5:02) and equating common powers of η results in

$$a_2 = -\frac{1}{2}\bar{h}\bar{h}'' = -\delta_2 \tag{5:06}$$

and

$$-\bar{h}\frac{d}{d\xi}\left[\delta_{2n}\bar{h}' + \delta_{2n-2}\frac{d(\alpha_2\bar{h})}{d\xi} + \ldots\ldots + \delta_2\frac{d(\alpha_{2n-2}\bar{h})}{d\xi} + \frac{d(\alpha_{2n}\bar{h})}{d\xi}\right] =$$

(5:07)

$$(2n+1)\left[(2n+2)(a_{2n+2}) + (2na_{2n}b_2) + \ldots\ldots + 2a_2b_{2n}\right]$$

The latter equation may be rearranged to the form

$$a_{2n+2} = \left[-\frac{2na_{2n}b_2 + (2n-2)a_{2n-2}b_4 + \ldots + 2a_2b_{2n}}{2n+2} - \frac{\bar{h}}{(2n+1)(2n+2)}\right]$$

(5:08)

$$\left\{\frac{d}{d\xi}\left[\delta_{2n}\bar{h}' + \delta_{2n-2}\frac{d(\alpha_2\bar{h})}{d\xi} + \ldots + \delta_2\frac{d(\alpha_{2n-2}\bar{h})}{d\xi} + \frac{d(\alpha_{2n}\bar{h})}{d\xi}\right]\right\}$$

which yields a recursion relation between a_{2n+2} and the a_i, b_i, α_i where $i < 2n$. Since a_{2n} and b_{2n} are related to δ_{2n} and α_{2n} through Eq. (5:05), it remains to relate α_{2n} and δ_{2n}. The required correspondence can be determined from the definition

$$\frac{h}{\bar{h}} = \frac{\bar{\rho}\,\bar{q}}{\rho\, q} = \frac{\bar{q}}{q}\left\{1 + \frac{\gamma - 1}{2}\,\bar{M}^2\left[1 - (q/\bar{q})^2\right]\right\}^{-1/(\gamma - 1)} \tag{5:09}$$

When

$$0 < \left(\frac{\gamma - 1}{2}\right)\bar{M}^2\left[1 - (q/\bar{q})^2\right] < 1 \quad ,$$

the right-hand side of Eq. (5:09) may be expanded as a binomial series. Using the abbreviation $1 - (q/\bar{q})^2 = \beta$,

$$\frac{h}{\bar{h}} = \sum_n \alpha_{2n}\eta^{2n}$$

$$= \left[\sum_n \alpha_{2n}\eta^{2n}\right]\left[1 - \frac{\bar{M}^2\beta}{2} + \sum_{n=2}\frac{(-1)^n\bar{M}^2\beta^n}{2^n n!}\left\{\left[(n-1)\gamma + 2 - n\right] \dots\dots [2\gamma - 1][\gamma]\right\}\right] \tag{5:10}$$

where

$$\beta = \eta^2\left[-2\delta_2 - \sum_{n=1}\left(2\delta_{2n+2} + 2\delta_{2n}\delta_2 + \dots + 2\delta_n\,\delta_{n+2} + \delta_n^2\right)\eta^{2n}\right]$$

and $\delta_n = 0$ for n odd.

Therefore, each α_{2n} can be computed; the first few are

$$\alpha_2 = (\bar{M}^2 - 1)\,\delta_2$$

$$\alpha_4 = (\bar{M}^2 - 1)\,\delta_4 + \left[\frac{1}{2}\bar{M}^2(\gamma\bar{M}^2 - 1) + 1\right]\delta_2^2$$

$$\alpha_6 = (\bar{M}^2 - 1)\,\delta_6 + \left[2 + (\gamma - 1)\bar{M}^2\right]\delta_2\delta_4 - \left[\frac{1}{2}\bar{M}^2\left\{(\gamma + 1)\bar{M}^2 - 1\right\} + 1\right]\delta_2^3$$

and the corresponding coefficients in the reciprocal series are

$$b_2 = -(\bar{M}^2 - 1)\,\delta_2$$

$$b_4 = -(\bar{M}^2 - 1)\,\delta_{.} - \frac{1}{2}\bar{M}^2\left[(\gamma - 1)\bar{M}^2 + 3\right]\delta_2^2$$

$$b_6 = -(\bar{M}^2 - 1)\,\delta_6 - (\gamma + 1)\bar{M}^2\delta_2\delta_4 + \frac{1}{2}\left[(\gamma + 1)\bar{M}^6 - \bar{M}^4 + 8\bar{M}^2 - 2\right]\delta_2^3$$

The coefficients of the $(q/\bar{q})$ and $(\bar{q}/q)$ series correspond as follows:

$$\begin{aligned} a_2 &= -\delta_2 \\ a_4 &= -\delta_4 + \delta_2^2 \\ a_6 &= -\delta_6 + 2\delta_2\delta_4 - \delta_2^3 \end{aligned} \tag{5:11}$$

and $\overline{M}^2$ is related to the known functions $\bar{h}(\xi)$ through Eq. (4:02). Substituting Eqs. (5:11) into (5:08) there results

$$\begin{aligned} \delta_{2n+2} = \Bigg\{ & \left[\frac{2nb_2}{2n+2} - \delta_2\right] a_{2n} + \left[\frac{(2n-2)b_4}{2n+2} - \delta_4\right] a_{2n-2} + \dots + \left[\frac{4b_{2n-2}}{2n+2} - \delta_{2n-2}\right] a_4 \\ & + \left[\frac{2b_{2n}}{2n+2} - \delta_{2n}\right] a_2 + \frac{(2n)!\bar{h}}{(2n+2)!} \frac{d}{d\xi}\left[\delta_{2n}\bar{h}' + \delta_{2n-2}\frac{d(\alpha_2\bar{h})}{d\xi} + \dots + \delta_2 \frac{d(\alpha_{2n-2}\bar{h})}{d\xi} + \frac{d(\alpha_{2n}\bar{h})}{d\xi}\right]\Bigg\} \end{aligned} \tag{5:12}$$

and from this general relation δ_4 and δ_6 are found as

$$\delta_4 = \frac{\overline{M}^2 + 1}{2}\,\delta_2^2 + \frac{\bar{h}}{12}\frac{d}{d\xi}\,\delta_2\bar{h}' + \frac{d}{d\xi}\,(\overline{M}^2 - 1)\,\delta_2\bar{h}$$

$$\begin{aligned} \delta_6 = \Bigg[& \delta_2\left\{\delta_4(\overline{M}^2 + 1) + \delta_2^2\left[\frac{(\gamma-1)\overline{M}^4 - \overline{M}^2 - 2}{6}\right]\right\} + \frac{\bar{h}}{30}\frac{d}{d\xi}\Bigg\{\delta_4\bar{h}' + \delta_2\frac{d}{d\xi}\left[(\overline{M}^2 - 1)\,\delta_2\bar{h}\right] \\ & + \frac{d}{d\xi}\left[\bar{h}\left\{(\overline{M}^2 - 1)\,\delta_4 + \delta_2^2\left[\frac{\overline{M}^2}{2}(\gamma\overline{M}^2 - 1) + 1\right]\right\}\right]\Bigg\}\Bigg] \end{aligned} \tag{5:13}$$

The desire to have an estimate of convergence stems from the fact that the recursion relation results from a formal substitution into the differential equation and a binomial expansion, neither of which may converge. However, the complexity of the general term is apparent from Eq. (5:12) and no rigorous convergence criterion has been found. It is still possible, though, to make several observations which

define useful regions adjacent to the nozzle centerline.

The error introduced by employing a finite series for Eq. (5:03a) may be estimated by a consideration of the magnitude of the first neglected higher order term. For example, the recent design procedure at this Laboratory has included terms up to η^5 and so $(\delta_6\eta^6)/(q/\bar{q})$ is a measure of the approximation. In Fig. 11 are shown the loci of constant values for that expression from 0.001 to 0.03 in the (ξ, η) plane. Centerline Mach numbers are indicated in a distorted scale. The inflection point locations for this Laboratory's nozzles have been included in the figure and are explained in the legend. The extreme design characteristics are also drawn.

It can be seen that the critical position is at the inflection point, which is also apparent from a consideration of the form of the velocity series. In all cases, the constructed nozzles lie below the 0.1% velocity error line at the inflection point. The decreasing slope of the design characteristic with increasing M_d is the major factor which permits the use of relatively short nozzles. Calibration measurements made within the test rhombus, centered on the exit plane, indicate that the $(\delta_6\eta^6)/(q/\bar{q}) = 0.001$ line in Fig. 11 is a suitable guide for use in selecting a maximum η_d.

The above manipulation for the two-dimensional estimate involves the removal of θ by formally differentiating the series; whereas Nilson[8] uses algebraic substitution. However, since the uniqueness condition on $\bar{h}$ is assumed to be satisfied, the resulting coefficients of η^2 should be identical. Moreover, Eq. (5:13) reduces identically to that given by Eq. (4:14), so that the formal differentiation seems to be valid. After determining the δ_{2n}, the θ_{2n+1} follow from Eq. (5:01) and (x, y) from Eqs. (1:07)(with $\zeta = 2$). The region of convergence for θ is determined by the q convergence which has a smaller convergence region than that for the binomial expansion of h. Thus. the (x, y) convergence may be deferred to the q convergence.

In the case of the axially symmetric nozzle the convergence was briefly investigated[7] and the results indicate that for a M = 1.79 exhaust flow the η_d streamline should be no greater than 0.5. A plot of the streamlines and characteristics is given by Friedrichs[7] and it is shown that the flow field folds over itself at a sufficient distance from the axis; that is, the characteristics of the same family (upstream running) intersect. This

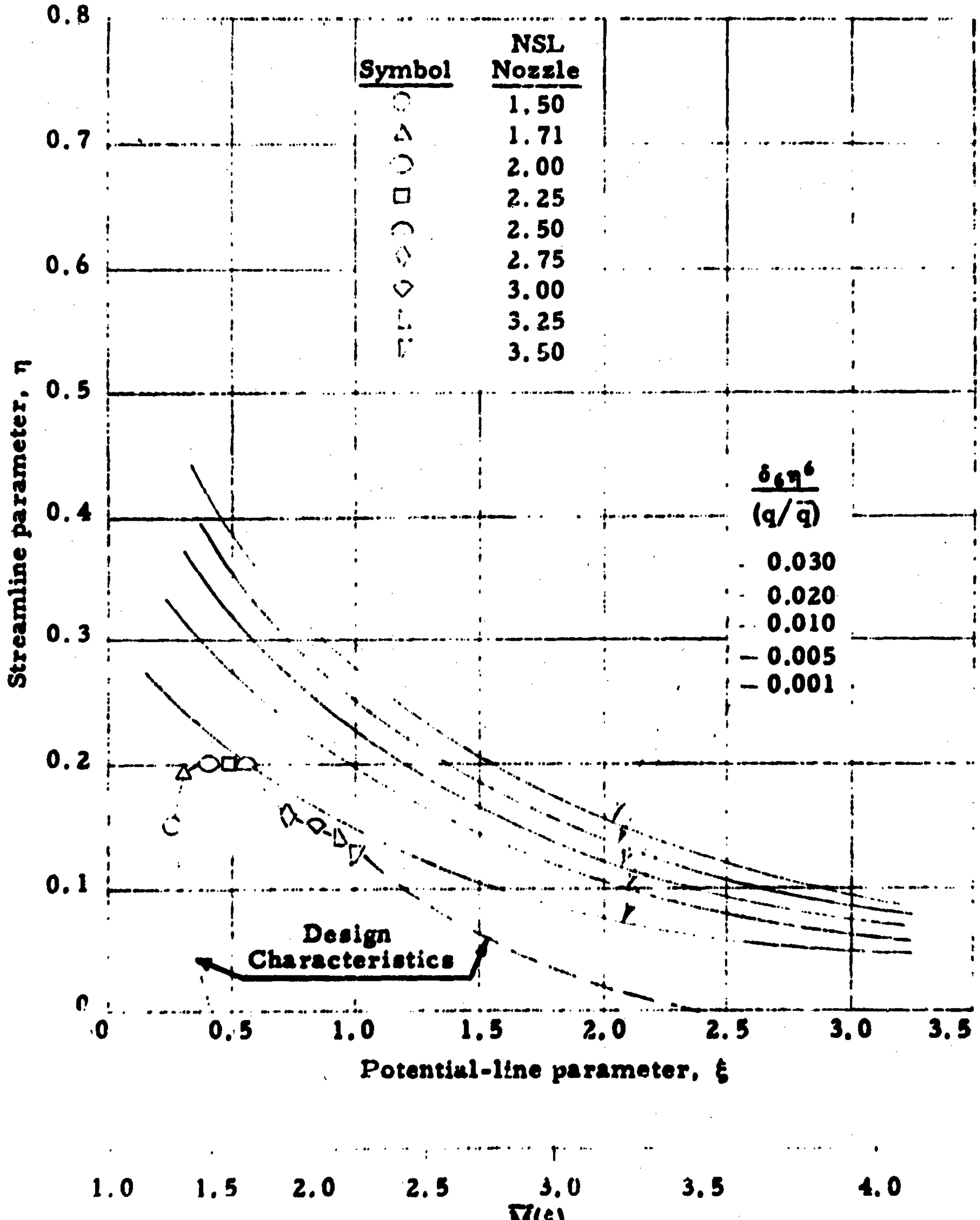

Fig. 11 Useful region of (ξ, η) plane
(Basis: $\bar{h} = 1 + \xi^2$)

is due to the fact that in the vicinity of the design characteristic the flow takes place at a decreasing Mach number as η increases. The slope of the backward running characteristics are, therefore, increasing also, but at a slower rate as one proceeds upstream. Eventually they intersect. As the design Mach number increases, the length of the design-characteristic line increases, and the change in slope is relatively greater compared to the characteristics in the simple wave region. It would appear, therefore, that the streamline values, η_d, must be of the same order of magnitude in this type of nozzle as in the two-dimensional case.

In general, both types of geometries indicate that the region of convergence decreases with increasing Mach number when the nozzle-generating function is a non-decreasing function of ξ.

A further result of the finite approximation is found when comparison is made between the slopes at opposite ends of the characteristic ab (Fig. 1). Since this characteristic lies in a simple wave region, the indicated slopes should be equal; in fact the slope is that of the constant velocity vector associated with ab. Any discrepancy is an indication of the computational and method accuracy. When the coordinates along IQ are differentiated numerically, (i.e., $\Delta y/\Delta x$) the result is found to be consistently higher than predicted by the simple wave theory. There appear to be four principal sources of possible error, which lead to a maximum error at the inflection point on the contour:

1. Failure of the finite polynomial $F + G\eta^2 + H\eta^4$ to represent exactly the slope of design characteristic in the (ξ, η) system;
2. Inaccuracies in the numerical procedure of integration (round-off error, etc.);
3. Failure of the finite polynomial representation for θ; and
4. Errors in the numerical differentiation of the contour.

Items 1 and 2, if applicable, imply that the computed design characteristic is not the "true" characteristic sought. In that event, the slopes in question would disagree even with no contributions from Items 3 and 4. Reducing the interval of integration (i.e., $\Delta\xi$) in the numerical integration computation tends to rotate the line in the clockwise sense and reduces the numerical error per step. However, the cumulative error remains

dependent upon the over-all length of the integration. A decrease in the interval $\Delta\xi$ does reduce the source of error from Item 4.

In practice, intervals of $\Delta\xi = -0.005$ have been employed in recent nozzle designs and represent a compromise between extreme accuracy and increased labor. The finite approximation has been improved over that given by Nilson[8] by inclusion of up to the 5th power of η terms as given in Section 4.

As a result of these improvements, a slope discrepancy of 8 percent in the $M_d = 3.0$ nozzle was reduced to 2 percent in the $M_d = 3.5$ design. Considering the longer length of integration involved in the latter design characteristic, this is an impressive reduction. It can be concluded, therefore, that the principal source of error is due to the finite approximation. Experimental data indicates that the remaining inaccuracy influences the flow pattern in a way comparable to that of the boundary layer.

One additional remark is in order with respect to the upstream extension of the contour in the subsonic region. The slope of the wall streamline is

$$\frac{dy}{dx} = \frac{\partial y}{\partial \xi}\frac{d\xi}{dx} = \frac{y_1'\eta_d + y_3'\eta_d^3 + y_5\eta_d^5}{1 + x_2'\eta_d^2 + x_4\eta_d^4}$$

and so is infinite for those values of ξ which are roots of the denominator. Assuming $\bar{h} = 1 + \xi^2$ these roots may be shown to correspond to local Mach numbers less than 0.1 and semi-heights, (y), greater than 6 throat semi-heights for $\eta_d < 0.2$. Unless the entrance-plane height to the nozzle is radically different from present-day practice, such results should introduce no difficulty. In any event, the extension of the subsonic contour where $M \rightarrow 0$ need only be smooth and non-decreasing.* Departures from the design curve for $M < 0.3$ should have little effect on the shape of the sonic line.

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*A two-dimensional subsonic-contraction design is outlined in Appendix II.

SECTION 6

CONTINUOUS CURVATURE NOZZLES

Due to the specific choice of nozzle-generating function, a curvature discontinuity occurs at the inflection point of all the nozzles currently in use at the NSL. On the basis of the calibration results, this is not a serious restriction for fixed block nozzles. Moreover, the now-available experimental data relating to the viscous parameters, which occur on the above basis, should be of value to similar applications in the future.

However, there remain several reasons for further interest in achieving a continuous curvature contour. These include: possible difficulty in the fabrication of a sharp discontinuity; the influence on boundary-layer growth; and the incompatibility with the structural aspects of flexible nozzles.

As presently applied, flexible nozzles employ a discrete number of jack points to bend the plate which serves as the nozzle contour. The jacks give rise to a discontinuous shear distribution and a continuous bending-moment distribution. Under conditions which are usually satisfied, the theories of structural mechanics show that the bending moment is proportional to the curvature. Generally, supersonic nozzles do have a discontinuity in curvature in disagreement with the last statement. It is clear then that special methods should be devised to satisfy the bending-moment requirements, although a more precise approach would include third-derivative changes corresponding to the jack locations. It should be borne in mind that this type of contour is rarely designed accurately, due to the adjustment which is possible during calibration tests.

Several generating functions which may be used with the Friedrichs method are considered in the remainder of this section.

6.1 General Requirements

Through the function $\bar{h}$ there is a correspondence between each point on the nozzle axis ($\eta = 0$, $\xi_d \geq \xi \geq 0$) and a point on the contour. Two such points of particular importance are the characteristic and inflection loca-

tions. The former is located at the intersection of the contour with the backward-facing design characteristic on which the exhaust Mach number is first attained. The latter is the intersection of the contour with a similar characteristic originating on the $\eta = 0$ axis at the point where $\bar{h}'' = 0$. In general, these two points are not coincident, but if the Mach number increases uniformly from unity at the throat to its design value (along some streamline), then it can be shown that the inflection point must be upstream of the characteristic point[19, 20, 21]. The exception to the latter statement occurs when the streamline curvature has a discontinuity, in which case the two points coalesce.

At $(\eta, \xi) = (0, \xi_d)$ the simple wave region (Fig. 1) shrinks to a point. Hence, at this position the discontinuities occur one derivative lower in order than the rest of the field. For the particular generating function discussed earlier, the complete specification is

$$\begin{aligned} \bar{h} &= 1 + \xi^2 \qquad && (\xi \leq \xi_d) \\ \bar{h} &= 1 + \xi_d^2 \qquad && (\xi \geq \xi_d) \end{aligned} \tag{6:01}$$

In this case, the $\bar{h}$ function is continuous and smoothly increasing up to the point $\xi = \xi_d$, at which there is a discontinuity in the first derivative, $\bar{h}'(\xi_d)$. It may be inferred, therefore, that in the region $\eta \neq 0$ the streamlines are continuous and have continuous first derivatives; however, they do exhibit second-derivative discontinuities across both the design and downstream-facing characteristics through $(0, \xi_d)$. Therefore, the inflection and characteristic points coincide for Eq. (6:01) and the contour has a discontinuity in curvature.

For a generating function with a continuous first derivative everywhere, the streamlines will have continuous derivatives of the second order. The discontinuity is then relegated to the rate of change of curvature and is again propagated along the aforesaid characteristics.

In the generating functions to be discussed below, the usual conditions for uniqueness will be satisfied:

$$\left[\bar{h}'(\xi)\right]_{\xi\to 0} = 1 + a\xi^2 + \ldots \quad (a > 0)$$

as well as the additional stipulations:

$$\begin{aligned} \bar{h}'(\xi_d) &= 0 \\ \bar{h}''(\xi_I) &= 0 \quad . \end{aligned} \tag{6:02}$$

The last equation serves as a definition of the inflection point, ξ_I, while the prior relation ensures the desired continuity. From the earlier remarks: $\xi_I \leqslant \xi_d$. Finally, the functions will be restricted such that $\bar{h}'(\xi) > 0$ for $\xi < \xi_d$.

6.2 Finite Polynomials

An extension of the earlier form of the generating function to a higher-order polynomial introduces a family of continuous curvature nozzles. For example, consider the relation

$$\bar{h}(\xi) = 1 + a\xi^2 - b\xi^3 - c\xi^4 \tag{6:03}$$

where a > 0 and the constants b and c are to be determined from the assumed conditions. Then

$$\begin{aligned} \bar{h}' &= a\xi\left(2 - \frac{3\xi}{a/b} - \frac{4\xi^2}{a/c}\right) \\ \bar{h}'' &= 2a\left(1 - \frac{3\xi}{a/b} - \frac{6\xi^2}{a/c}\right) \end{aligned} \tag{6:04}$$

With the notation $\Lambda = (\xi_d/\xi_I) > 1$, the constants may be written in the form

$$\begin{aligned} (a/b) &= \frac{3}{2}\,\xi_d\left[\frac{2\Lambda - 3}{\Lambda^2 - 3}\right] \\ (a/c) &= 2\xi_d^2\left[\frac{2\Lambda - 3}{\Lambda(2 - \Lambda)}\right] \end{aligned} \tag{6:05}$$

The length of the nozzle may be adjusted by the scale factor "a". A useful form for Eq. (6:03) is now

$$\bar{h}_d = 1 + a\xi_d^2 \left[1 + \frac{\Lambda^2 + 6\Lambda - 12}{6(3 - 2\Lambda)} \right] \qquad (6:06)$$

Denoting the bracket on the right-hand side by $K(\Lambda)$. it is seen that $K > 0$ for $\bar{h}_d > 1$. Consideration of the zeros and poles of K shows that the useful range for Λ is $(3 + \sqrt{3}) > \Lambda > (3/2)$, if it is required that $\bar{h}_d$ be non-decreasing. The larger Λ value corresponds to an infinitely long nozzle and as $\Lambda \to (3/2)$ the length decreases ("a" held constant). In Fig. 12a $K(\Lambda)$ is shown for a part of the useful region and the signs of b and c are indicated. Note that each point on the curve represents a family of contours whose length depends upon "a".

The design ξ_d is now a function of both exhaust Mach number and Λ as given by Eq. (6:06). Fig. 12b illustrates the dependence on Λ with M_d as a parameter. The influence of the scale factor (a) is shown in Fig. 13a for the particular case of $c = 0$, corresponding to $\Lambda = 2$. Comparison is made with Eq. (6:01) for a nozzle design with Mach number 3 exhaust flow. The $b = 0$, with $\Lambda = \sqrt{3}$, is similar, but results in shorter lengths for equal "a" values. In practice, the curves would, of course, continue as horizontal lines at their peak levels where $\eta = \xi_d$. Equal values for "a" are seen to yield very appreciable increases in length for the continuous as compared to the discontinuous $\bar{h}$ types. Equivalent lengths here correspond to a = 3 and 2 in the c = 0 and b = 0 cases, respectively. Increasing "a" by a factor of approximately four decreases the distance to the start of the test rhombus by about one half; the influence on the pressure gradient is apparent.

The curves in Fig. 13b show the effect of changes in Λ over the range 1 to 2. As mentioned earlier, the length decreases as $\Lambda \to 3/2$. Two additional (dashed line) curves illustrate the $\bar{h} > \bar{h}_d$ distributions which result for $1.28 > \Lambda > 1$; the implication is that the flow attains a $M > M_d$ and recompresses to the design value. Centerline Mach-number distributions for the illustrated cases of Fig. 13 are shown in Fig. 14.

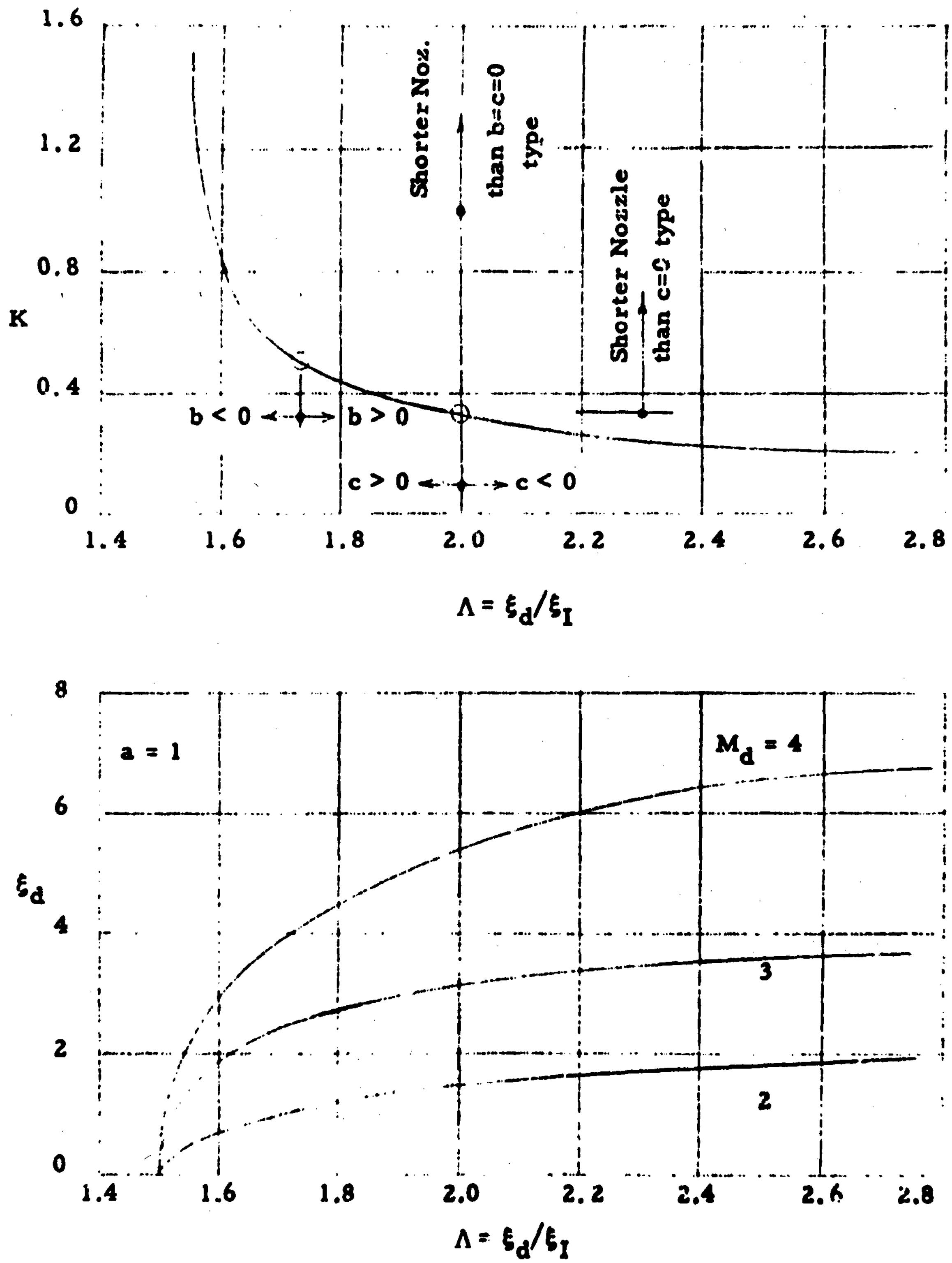

Fig. .2 Parameters for continuous-curvature nozzles based on finite-polynomial generating function

6.3 Trigonometric Functions

Employment of trigonometric functions for $\bar{h}$ is a simplification in that the derivatives are repetitive in nature up to a constant. An example is

$$\bar{h}(\xi) = 1 + b \sin^2\left(\frac{\pi}{2}\frac{\xi}{\xi_d}\right) = 1 + \frac{b}{2}\left[1 - \cos\left(\pi\frac{\xi}{\xi_d}\right)\right] \qquad (6:07)$$

in which $b = \bar{h}(\xi_d) - 1$. Here the Mach number is fixed by "b" and ξ_d serves as a scale factor. The uniqueness condition and Eqs. (6:02) are clearly satisfied. A comparison is made in Fig. 15 between the centerline Mach-number distributions for the polynomial and trigonometric-generating functions, and the differences can be seen to be small.

The radius of curvature at the throat may be approximated by

$$R^* \cong \frac{1}{\bar{h}'' \eta_d} \qquad (6:08)$$

so that

$$R^*_{trig.} \cong \frac{2\xi_d^{\,2}}{\pi^2\left[\bar{h}(\xi_d) - 1\right]\eta_d} \qquad (6:09)$$

$$R^*_{poly.} \cong \frac{1}{2a\eta_d}$$

Hence the ratio of the radii of curvature is

$$\frac{R^*_{trig.}}{R^*_{poly.}} \cong \frac{4a}{\pi^2}\frac{(\xi_d)^2_{trig.}}{\left(\frac{A}{A^*} - 1\right)}$$

and for the same nozzle lengths (specifically $a = 1$, $\xi_{d_{trig.}} = 3.02$) for $M_d = 3$.

$$\frac{R^*_{trig.}}{R^*_{poly.}} \cong \begin{array}{l} 1.14 \text{ for } c = 0, \quad b = 0.214 \\ 0.80 \text{ for } c = 1.61, b = -4.35 \end{array}$$

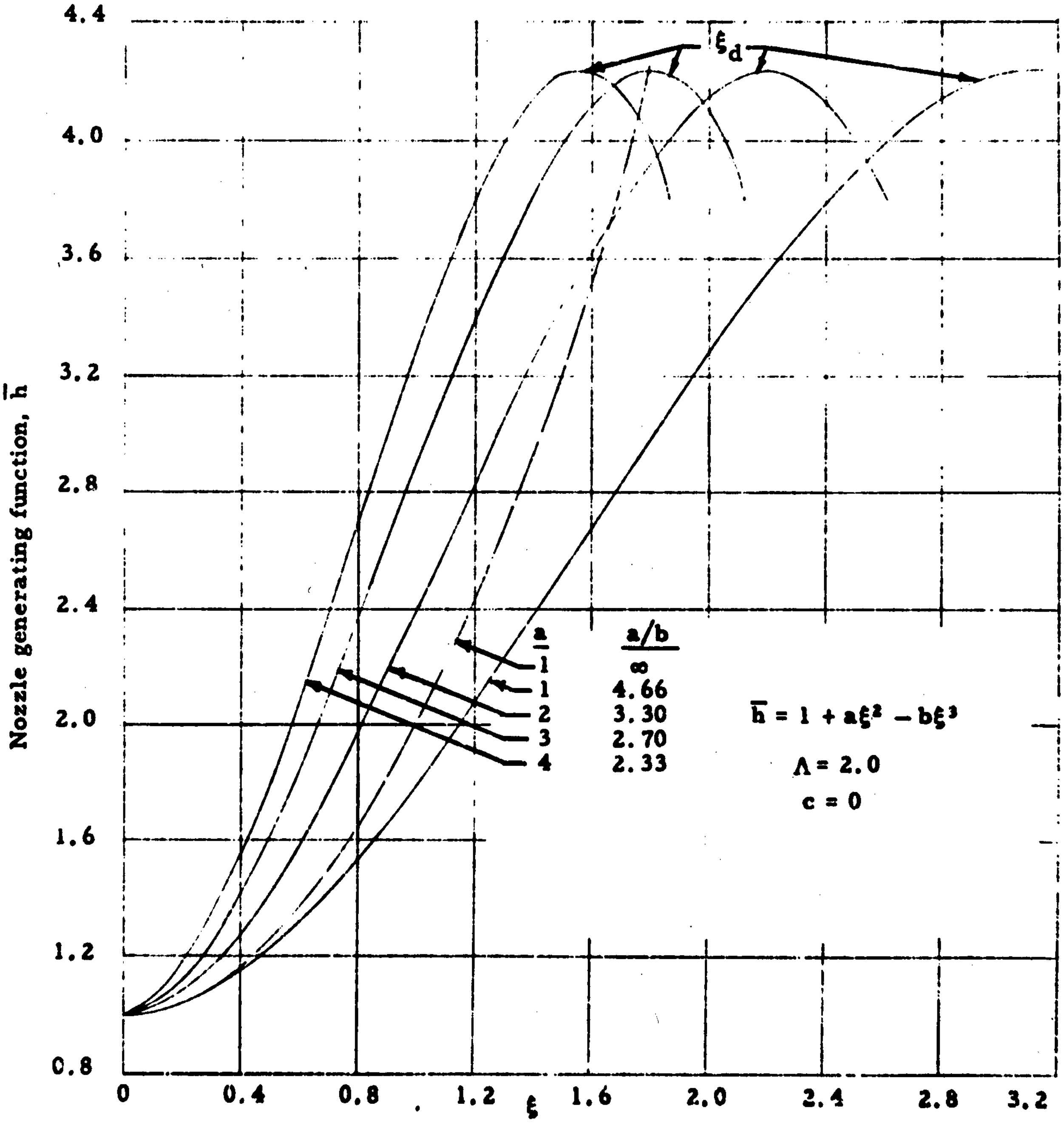

Fig. 13a Finite-polynomial nozzle-generating function distributions for continuous-curvature nozzles, $\Lambda = 2$, c = 0,

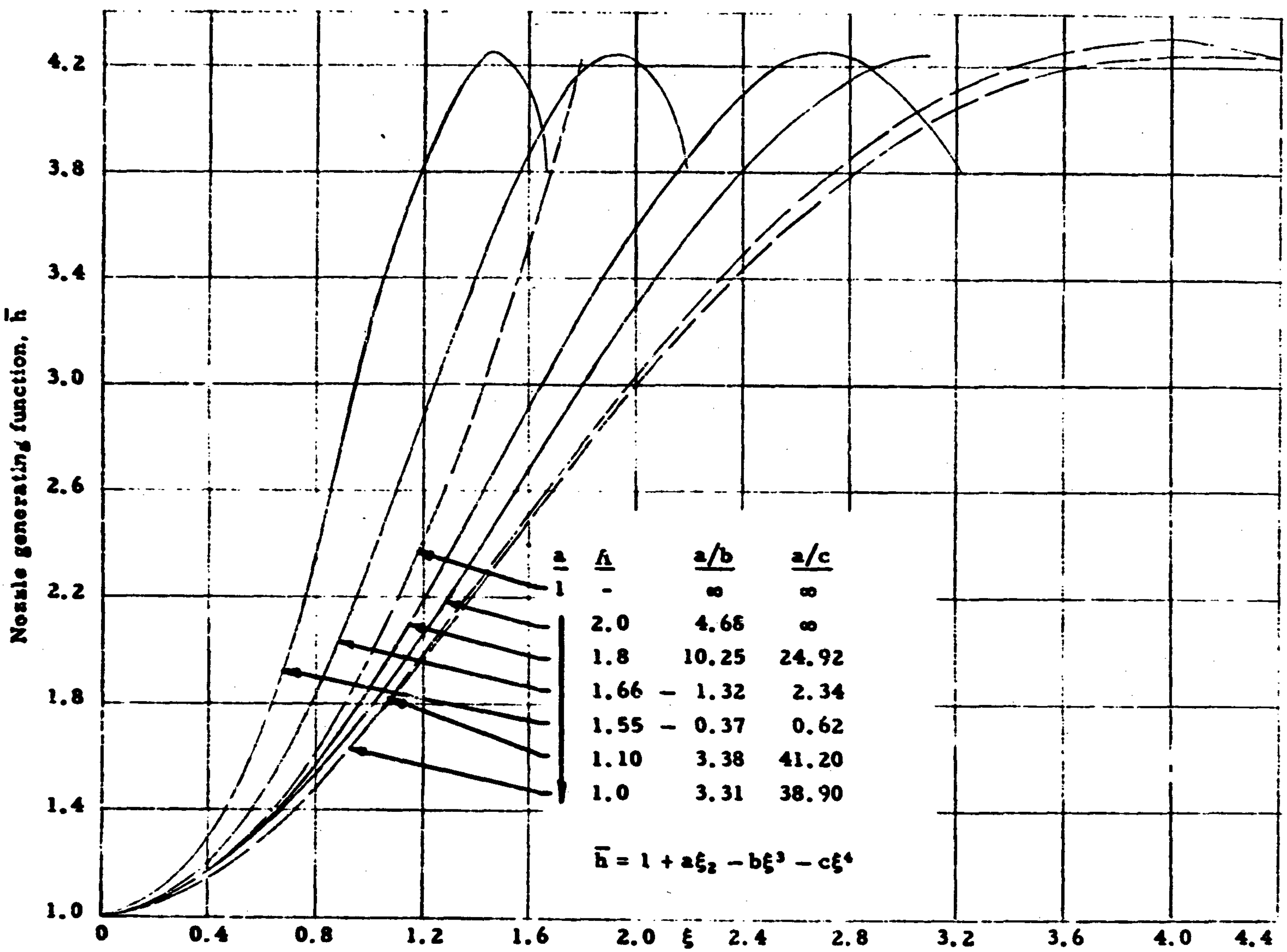

Fig. 13b Finite-polynomial nozzle-generating function distributions for continuous-curvature nozzles, a = 1

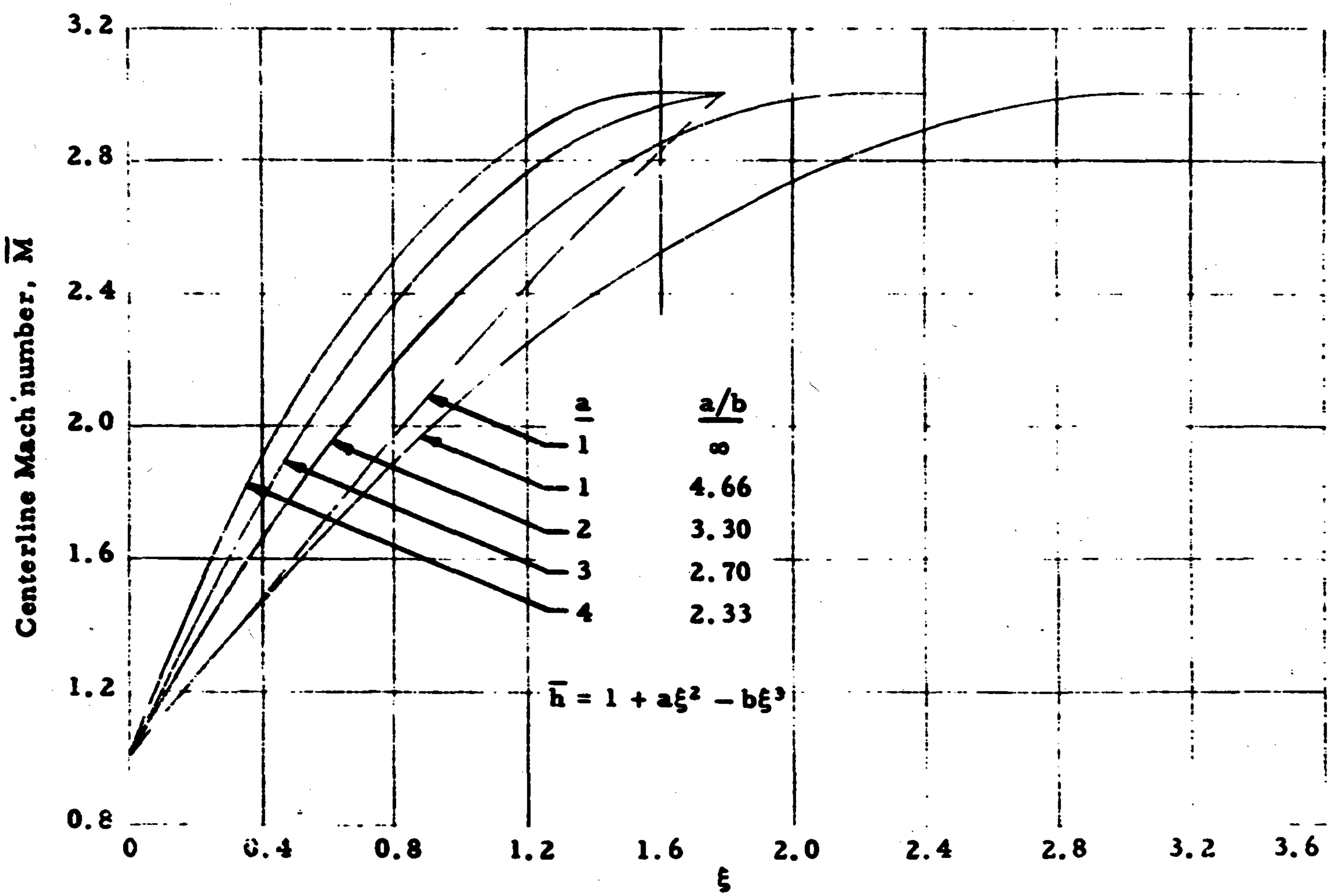

Fig. 14a Mach-number distributions along the nozzle axis for continuous-curvature nozzles, finite polynomial basis, $\Lambda = 2$, $c = 0$, $M_d = 3$

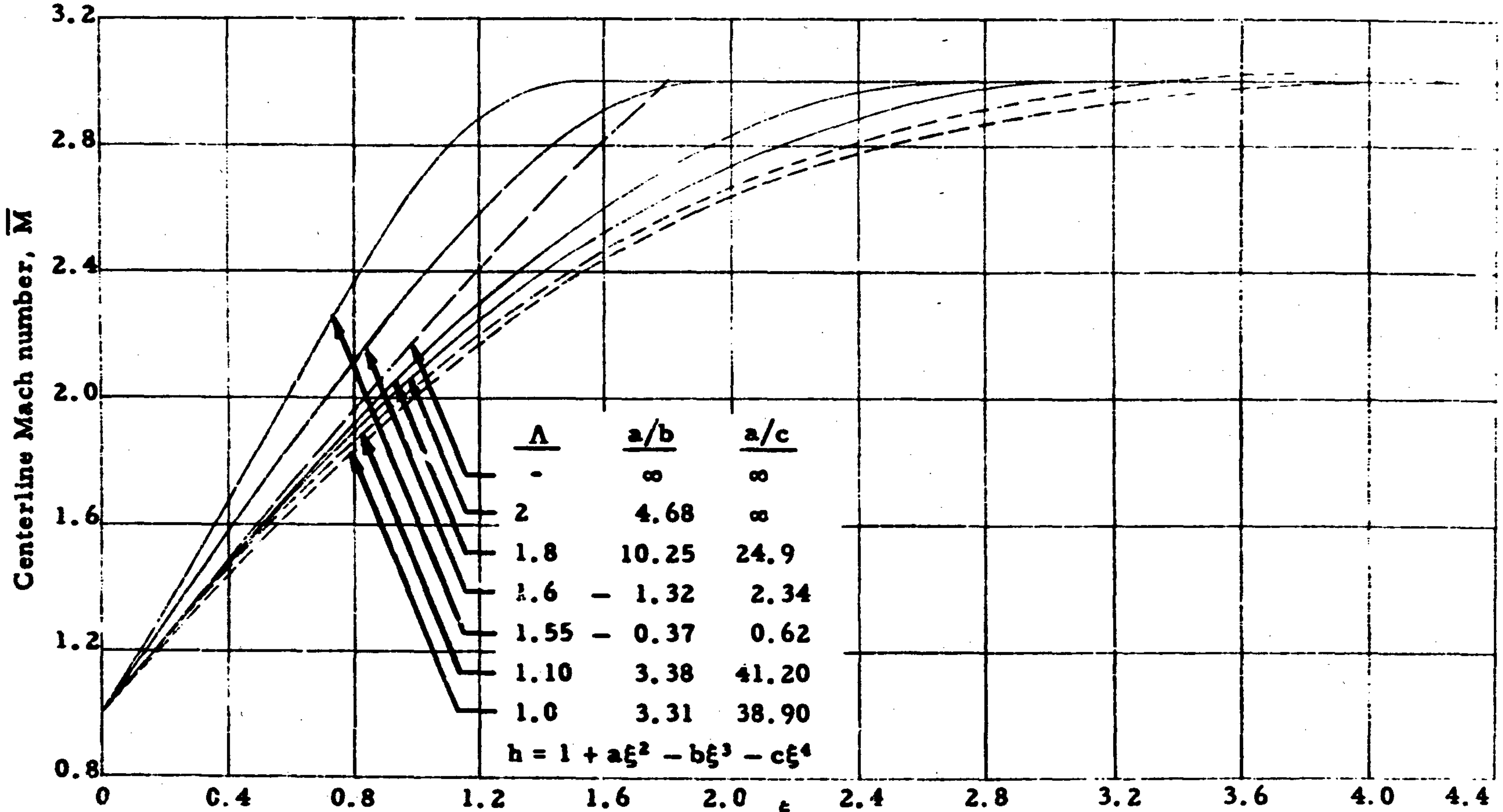

Fig. 14b Mach-number distributions along the nozzle axis for continuous-curvature nozzles, finite polynomial basis, $a = 1$, $M_d = 3$

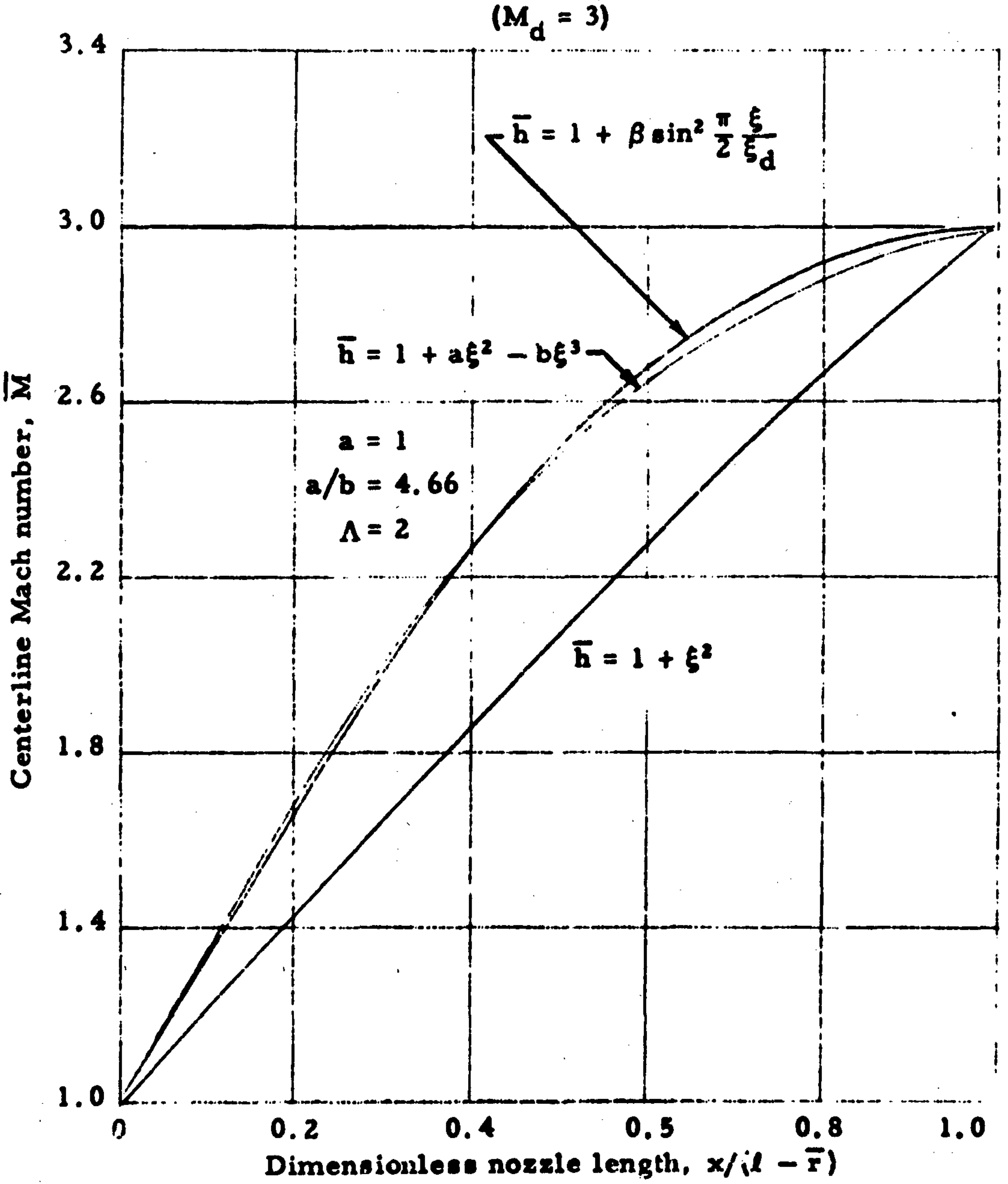

Fig. 15 Comparison of Mach-number distributions along the nozzle axis for trigonometric and finite-polynomial continuous-curvature nozzles, and a discontinuous-curvature nozzle

Again there appears to be no real choice between the two functions, but it is evident that the polynomial yields more freedom of control with regard to the shape of the contour.

It should be noted that the nozzle-generating function given by Eq. (6:07) cannot be extended upstream of $-(\xi_d)$, since the periodicity of the function becomes important. Similarly the subsonic contour for the continuous curvature polynomial should be cut off for

$$\xi < -\left[\frac{3b}{8c} + \sqrt{\frac{9}{64}\left(\frac{b}{c}\right)^2 + \frac{1}{2}\frac{a}{c}}\right]$$

6.4 Asymptotic Functions

Still another type of continuous curvature $\bar{h}$ can be constructed and is of especial interest since it produces an asymptotic approach to the desired exhaust flow. One such form is

$$\bar{h} = 1 + \frac{a}{3}\left\{\log\left[\frac{\sqrt{\xi^2 - \xi + 1}}{\xi + 1}\right] + \frac{\pi}{6} + \tan^{-1}\left(\frac{2\xi - 1}{\sqrt{3}}\right)\right\} \qquad (6:10)$$

for $\xi > -1$, and another

$$\bar{h} = a + b\Phi_1(k\xi) \qquad (6:11)$$

where $\Phi_1(k\xi)$ is the first derivative of the error function, and

$$a = \frac{(M_d^2 + 5)^3}{216 M_d}$$

$$b = \frac{1 - a}{\Phi_1(0)} \qquad (6:12)$$

$$\Phi_1(0) = 1.128$$

Computations based upon Eq. (6:11) are particularly simple since the derivatives of Φ_1 are tabulated.[31] More important, however, is that for this infinite nozzle the entire contour is computed from the power series. Of course, some Mach-number gradient must be accepted in the designated model region. From the practical viewpoint, one may choose a

region such that the gradient is smaller than accepted standards of flow quality. Fig. 16 illustrates two M_d - 2.25 asymptotic nozzles and compares them with the $\bar{h} = 1 + \xi^2$ contour.

6.5 Minimum Section and Inflection-Point Locations

For flexible nozzles, the axial movement of the minimum section and/or inflection point with changing M_d is of concern due to the need for relatively more jacks near these locations. Holding such points fixed, or nearly so, minimizes the problems associated with small radii of curvature or rapidly changing curvature.

It may be shown that

$$\eta_d = \frac{\xi_d}{\bar{h}_d\left[\frac{\ell}{h_T} - \sqrt{M_d^2 - 1}\right]} \tag{6:13}$$

from the geometry of Fig. 1. Hence, the proper choice of streamline may be found from the above equation for a given (ℓ/h_T) and $\bar{h}$. This has been carried out by way of example for a nozzle-length semi-height ratio of 4.5 for Eq. (6:03) with c = 0. The results are shown in Fig. 17 as a function of M_d with the length parameter $4 > a > 1$. Such a plot permits the designer to ensure a fixed throat location by suitably choosing corresponding "a" and η_d pairs for each M_d.

A considerable amount of computing is required to establish exact similar curves for the inflection point (due to numerical integrations along the design characteristic). However, the completed analyses may be used to approximate the locii of (x_I/h_T) = constant. The dashed lines in Fig. 17 have been estimated for the discontinuous curvature case from the accumulated computations by Nilson[8] and at this Laboratory.

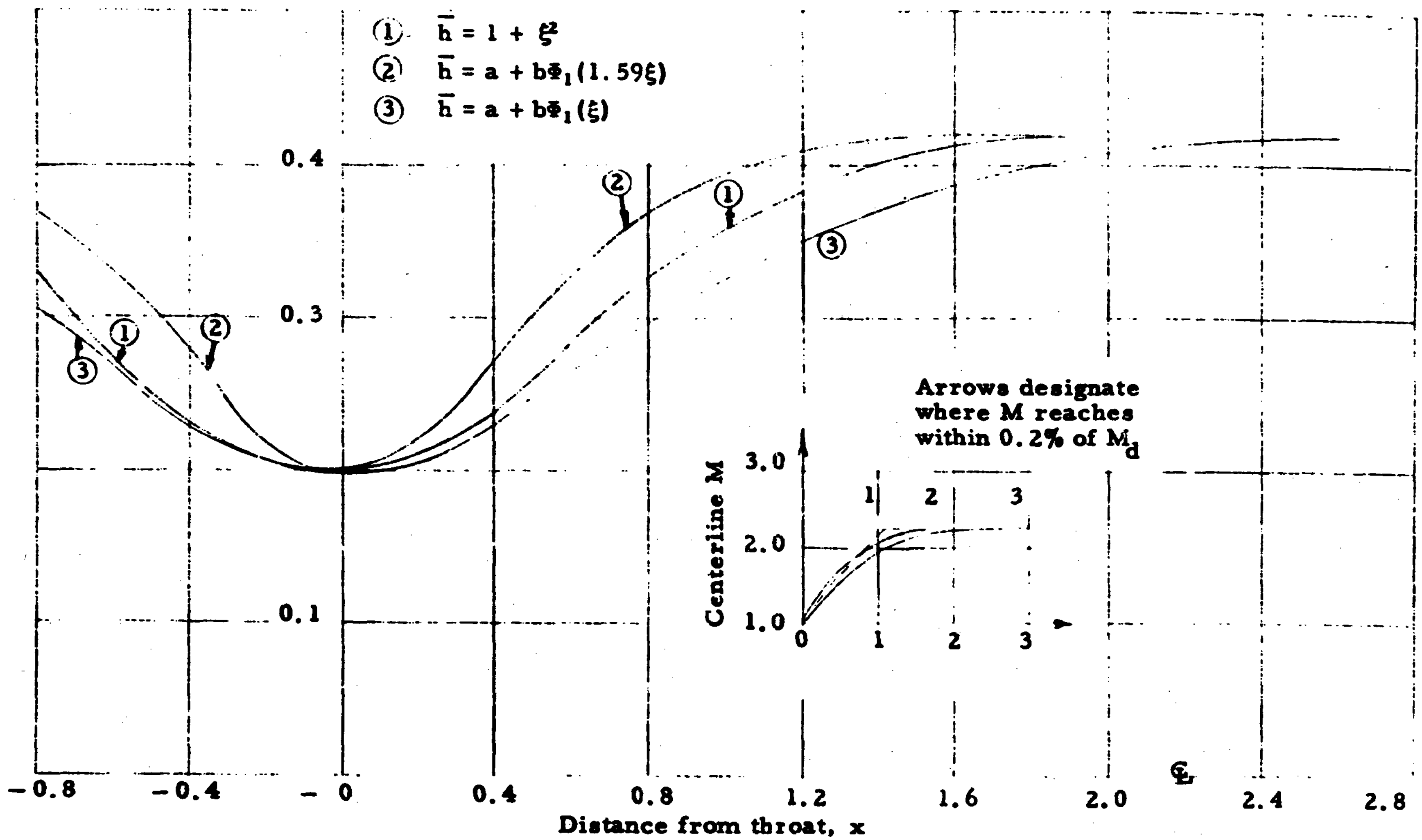

Fig. 16 Nozzle contours for asymptotic and discontinuous-curvature generating functions, M_d = 2.25

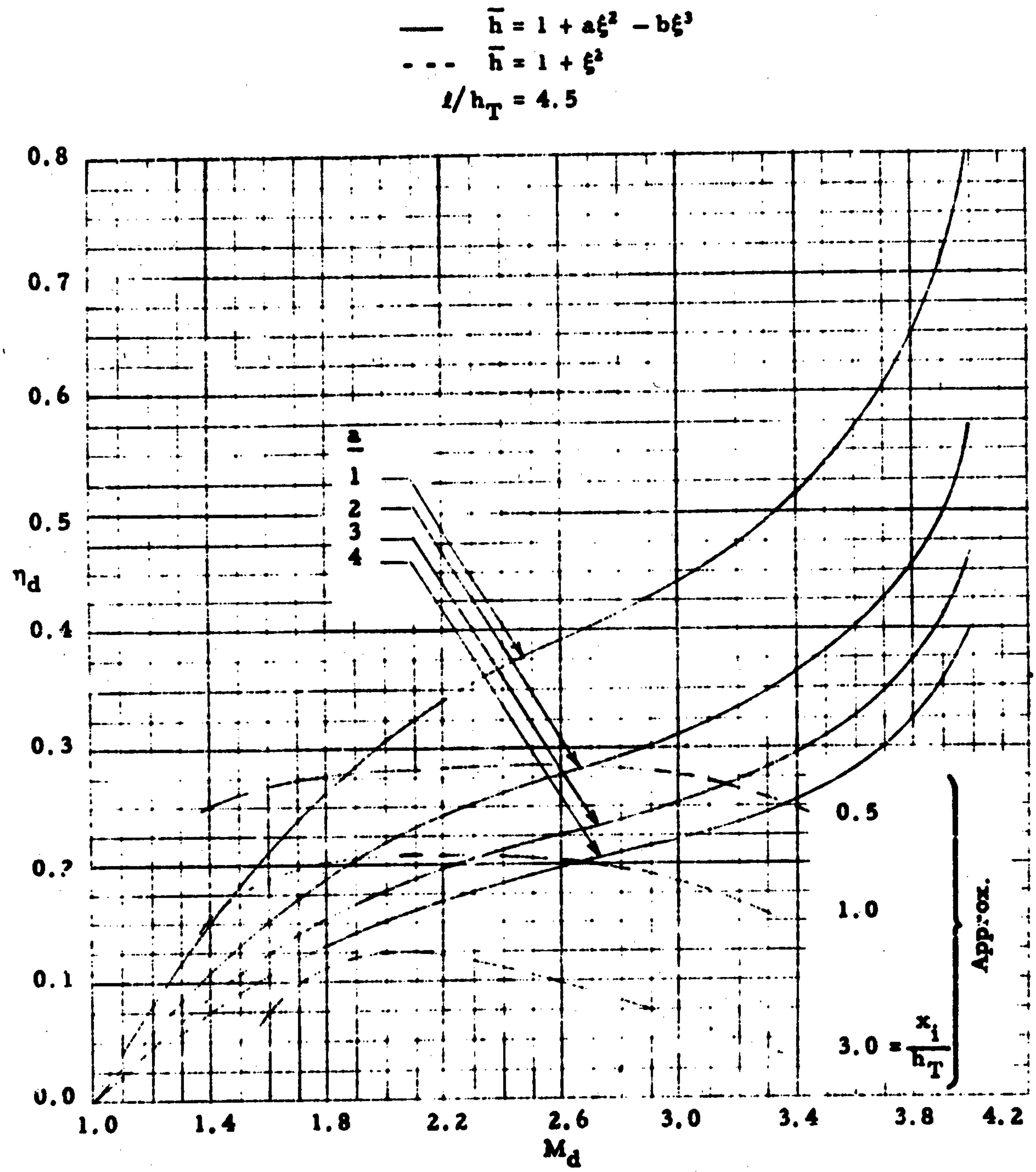

Fig. 17 Locii of design streamline values for fixed throat and inflection-point positions

SECTION 7

VISCOUS EFFECTS

All of the preceding discussion has been postulated on the existence of an inviscid, thermally non-conducting medium which presumably would be used for practical test purposes. Of course, no such fluid is available; but the problem is reduced in scope by Prandtl's hypothesis[32] that the shear layer is confined to a thin layer adjacent to the solid boundaries. In any event, many important phenomena (e.g., skin-friction drag, separation, shock boundary-layer interaction, and heat transfer) require viscous fluids for their study in the wind tunnel. Consequently, the effects of viscosity on the flow through a nozzle must be taken into consideration.

In this section, the correction methods applied to the NSL nozzles to account for the viscosity of air are briefly reviewed.

7.1 Basis for Viscous Correction

It is well known that the velocity of moving air vanishes at the boundary relative to the boundary. As a result, a layer of high shear is present, as characterized by the familiar velocity profile, and the inviscid design is in error with respect to: 1) the mass flow through a given nozzle cross-section, and 2) the imposed boundary condition for wave reflection and cancellation. It has been standard practice, generally, to neglect the latter difficulty and to alter the design to allow the proper mass flow.

From a consideration of the continuity equation, there follows von Karman's displacement thickness,[33] which for compressible flow is

$$\delta^* = \int_0^{\delta} \left[1 - \frac{\rho u}{\rho^0 U} \right] dy = \int_0^{\delta} \left[1 - \left(\frac{M}{M^0}\right)\left(\frac{T^0}{T}\right)^{1/2} \right] dy \qquad (7:01)$$

Assuming that the growth of δ^* along the boundaries may be computed from knowledge of the property profiles within the layer, the mass-flow correction implies that

$$y(x)_{viscous} = y(x)_{inviscid} + \delta^*(x) \qquad (7:02)$$

However, in general, the sidewalls to the nozzle are plane and parallel surfaces. Application of Eq. (7:02) to them would introduce severe difficulties into the construction of the test section and the schlieren system. It has been the practice at the NSL to compute an "effective displacement thickness", δ^*_{eff}, based upon the semi-perimeter displacement area on one block and one sidewall. Formally

$$\delta^*_{eff} = \frac{(\delta^*_{contour})(\text{tunnel width}) + (\delta^*_{sidewall})_{average}(2y)}{(\text{tunnel width})} \qquad (7:03)$$

where, for simplicity, $(\delta^*_{sidewall})_{average}$, is taken to be the average of the contour and sidewall-centerline displacement thicknesses.

Since $\delta^* = \delta^*(x)$, the aforementioned correction procedure alters the prescribed slope variation along the contour which was determined on the basis of uniform exhaust flow. It is by no means obvious that the distortion of the wave-reflection process by the shear layer in combination with the increment in slope, $d\delta^*/dx$, should result in uniform flow. However, experimental evidence indicates that the procedure is reasonable.

A correction based upon the apparent reflection point of the incident waves entering the layer has been given by Tucker.[34] However, the necessary expansion of the contour with this method is incompatible with the mass-flow criterion.

7.2 Computation of Boundary-Layer Growth

The machine computations carried out by Tucker[34, 35] have been used to compute the boundary-layer growth for the NSL nozzles. His analysis is based upon an isoenergetic layer adjoining an insulated boundary, both of which are reasonable when operating at moderate stagnation temperatures. In addition, it is assumed that the velocity profile is adequately represented by a power law,

$$\frac{u}{U} = \left(\frac{y}{\delta}\right)^{1/N} \qquad (7:04)$$

and that the following empirical skin-friction relation for low speed flow

is valid:

$$\frac{\tau}{\rho^0 U^2} = \frac{0.0131}{(RN)^{1/7}} \tag{7:05}$$

Originally[34] it was suggested that wall properties be used as a basis for the Reynolds number in the skin-friction formula. Later[35] an arithmetic mean temperature of the layer was shown to furnish a much better correlation of Eq. (7:05) with an extended Frankl-Voishel analysis for supersonic Mach numbers. It is worthwhile to note that Coles'[36] flat-plate data is in good agreement with the latter.

Tucker assumes the velocity-profile growth is in accord with

$$N = 2.2(RN)^{1/14} \tag{7:06}$$

and it is interesting to note that with heat transfer,[37]

$$N = 1.74(RN)^{1/14} \tag{7:07}$$

was found experimentally. Since it is convenient to hold N constant during the incremental computation, a detailed investigation of its effect on the results was considered for the M = 2.5 nozzle. The predicted δ^* values on both the contour and sidewall were found to agree within a few percent when comparing a varying N result with the value obtained for N = 7 throughout. On this basis, a constant N was assumed in all further computations. Experimental values for N are listed adjacent to each data point in Fig. 40 where comparison is made with theoretical locii for the boundary-layer parameters δ^*/δ, θ/δ, and δ^*/θ for N = 7 and 9. Further discussion of the experimental results appears in Section 11.

The starting point for the boundary-layer growth was taken at the nozzle throat (x = 0) in all instances. For the first nozzle to which a correction was added, the throat δ^* was based upon prior measurements on the M = 2 blocks. Displacement thickness growth along the subsonic contour of the latter was computed for several values of δ^* at the entrance plane and the $\delta^*_{entrance}$ was chosen which yielded the measured δ^*_{throat}.

An equivalent flat-plate length, with $M_{entrance}$ flow over it, resulted in an effective starting point for the reversed procedure for the M = 2.5 nozzle. A satisfactory comparison between the computed δ^*_{throat} and the later measured value was realized (Fig. 38b). Subsequent δ^*_{throat} assumptions were based in part upon extrapolation of the available data.

Some typical growth distributions are shown in Figs. 18 and 19 for both the contour and sidewall centerline. A comparison with the experimental data (Fig. 39) shows the earlier mentioned underestimation by the Tucker analysis. Observe that the best agreement is for $M_d = 2$ and that Tucker's experimental evidence[34, 35] was obtained in a M = 2.1 nozzle. The sidewall boundary-layer growth is also under estimated by the analysis and probably relates in part to the necessary assumptions for diverging flow.

A smoothness equal to that of the inviscid design coordinates is required of the δ^* distribution. Although the accuracy of the mass flow basis and the growth analysis is somewhat doubtful, a sufficient number of figures are required to meet this condition. Fortunately, the theoretical waviness distribution is virtually unaffected by the addition of δ^* to the inviscid contour.

Allowance for expanding the contour must initially be made when choosing a suitable η_d for the test-section geometry. Estimates of the effective test-section heights on the basis of an average $\Delta\delta^*/\Delta x$ from experimental data usually suffice for this purpose. The remaining difference, after the computation is completed, has been fitted to the slightly compressed or extended nozzle (about 1 percent), resulting from the final scale factor.

7.3 Heat Transfer

The operating conditions of the NSL tunnel normally employ a stagnation temperature of 110°F. With a flat-plate recovery factor, r, of 0.881,[38] where

$$r = \frac{T_{aw} - T^0}{T_0 - T^0} \quad , \qquad (7:08)$$

the indicated adiabatic wall temperatures are very close to room temperature. The assumptions made by Tucker are, therefore, quite reasonable for this installation.

In considering higher test Mach numbers, however, it is necessary to increase the stagnation temperature sufficiently to avoid condensation of the air components. Recent experiments conducted at the NSL[39] indicate that the pressure gradient has little effect on the recovery factor, and that $0.88 \leqslant r \leqslant 0.90$ with virtually a Mach number dependence only. The higher r value applies at $M \cong 3.5$. The negligible effect of cooling upon the growth of δ^* is shown in Fig. 38a[39] for a boundary layer developing along the sidewall centerline.

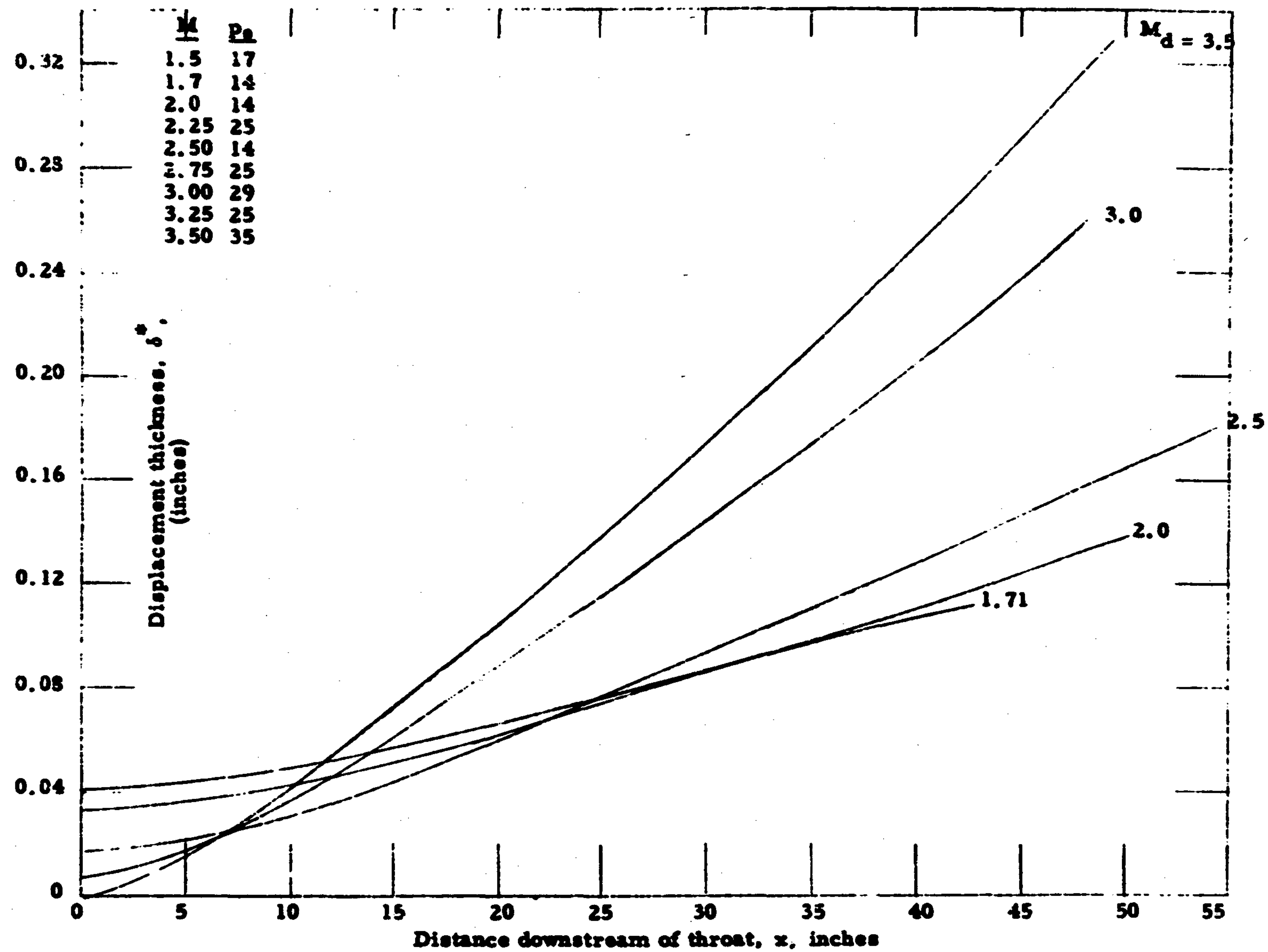

Fig. 18 Computed displacement thickness distributions along nozzle contour

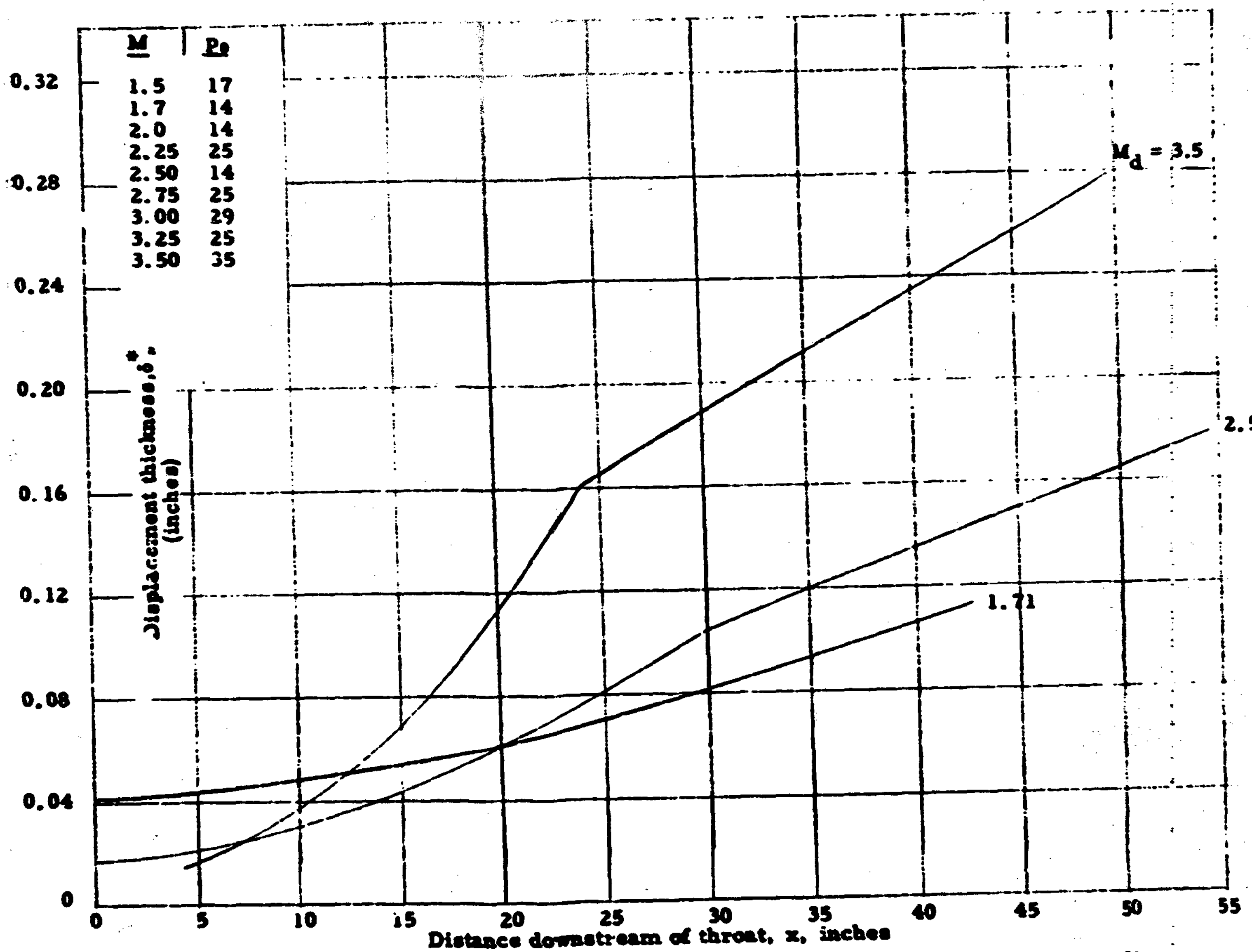

Fig. 19 Computed displacement thickness distributions along sidewall centerline

SECTION 8

FABRICATION

The careful choice of an accurate design method and the subsequent consideration given to numerical exactness are of no avail, if the workmanship applied to the physical blocks is not comparable in terms of the aerodynamics effects. Due to the significant influence of the slope at a point on the boundary upon the properties of the flow along the characteristic originating at that location, extreme care is necessary to prohibit small wavelength oscillations (waviness) of the contour between any imposed coordinate tolerances. A simple, but very satisfactory instrument has been employed to locate such sources of error during construction of the nozzles at this Laboratory. An analysis relating such waviness to the flow perturbations is included in Section 9.

The use of a waviness gage is, of course, only one of the steps in the assembly of the blocks. In this section, a brief resume is given of the physical characteristics of the nozzles in the procedural order of construction. Although the methods outlined here are by no means unique, they should serve to illustrate some items of importance in the over-all design.

8.1 Template

Experience has shown that the master template for a nozzle represents the crucial phase of the effort. The utmost care has consequently been lavished upon it.

Coordinates are specified to the shop for axial intervals of 0.5 in. and ordinates to the nearest 0.001 in. Ordinarily, the computed coordinates are not conveniently spaced equally in the x direction; in this case large-scale plots may then be drawn and the y semi-heights read off at the desired axial intervals. Alternatively, if a sufficient number of points are computed, linear interpolation is possible, taking care that this does not violate the y specification. A balance between the Δx interval and the y values is necessary to eliminate the introduction of "steps" in the contour due to rounding-off of the ordinate figure. The coordinate specifications mentioned above represent a balance between the available milling-machine settings and a minimum of reworking for waviness removal.

The templates are machined from either hot- or cold-rolled sheet steel (1/8-inch thick) with a rough cut to the approximate pattern preceding the final precision work, due to possible warping of the stock. Stiffener forms are added during the final rough machining process to prevent lateral flexing, and the surface is finished manually according to curvature predictions (Fig. 20).

If the length of the chord joining the end points of a circular arc is denoted by k_d, then the rise, h_r, is given by

$$h_r = \frac{(1 + y'^2)^{3/2} - \sqrt{(1 + y'^2)^3 + (k_d/2)^2 (y'')^2}}{y''} .$$

Assuming that for small (k_d/ℓ), the nozzle contour approximates a circular arc over the span k_d, this equation may be used to relate the rise to the second derivative of the wall, since

$$h_r \cong \frac{1}{2} \left(\frac{k_d}{2} \right)^2 y''$$

is reasonable in practice, especially in the vicinity of the throat and exit plane.

Standard forms for computing y'' have been given in Section 4, and k_d depends upon the indicating device employed. Fig. 20 shows the waviness gage (k_d = 2.07 in.) used in checking the templates for the Laboratory's nozzles. It consists of a square base plate with two fixed legs, a sensing arm midway between the legs, and an aligning surface which bears upon the side of the template; the sensing arm is part of a standard displacement gage which reads to 0.0001 inches. With practice, a skilled workman can remove the majority of the waviness remaining after the usual smoothing procedure is completed. Only the gage, a file, and patience are required.

Typical waviness distributions as measured on templates and nozzle blocks are illustrated in Fig. 21. The results for the early (chronologically) nozzles exhibit deviations which show up in the calibration measure-

ments of Mach number in the test region. The close correspondence between the block waviness and that of the template illustrates the value of time spent in improving the master template, and incidentally, attests to the splendid capabilities of the craftsman who fashions the block.

Further remarks on the influence of the waviness will be deferred to later sections.

8.2 Blocks

The main features of the physical nozzle blocks are shown in Fig. 22. The contour is shaped from kiln-dried straight-grain (Honduras) mahogany, which is lengthwise laminated and glued together with Urea resin (Weldwood). Both to minimize shrinkage and to allow for sawing cutouts, the over-all width of 18 inches is formed from three doweled sections of 6-inch widths made up of 3/4-inch laminations.

The sides of the block are measured accurately after preliminary attachment to the 24 ST annealed aluminum sole plate. Subsequent disassembly allows accurate installation of the static-pressure taps, pressure seal, etc. The seal is quite important due to the large pressure differences that exist between various segments of the contour during operation. A detailed drawing of the static-pressure tap insertion is shown in Fig. 23.

The rough wooden blocks are undercut by approximately 0.005 inches, in anticipation of 10 coats of DuPont Preparakot. Between each spraying, the surface is hand rubbed so that the final product is both smooth and hard, matching the design coordinates within 0.005 inches. Dimensional checks are carried out with the aid of the template and feeler gages, so that the skill of an experienced woodworker cannot be overestimated in this phase of the project. Approximately six weeks are required for two men to finish a pair of blocks, starting with the initial laminating operation. Several of the Laboratory's blocks are shown in Fig. 24.

8.3 Handling

A small overhead crane furnishes the main support for the block (up to 400 pounds) while the operating crew (four men) manually position each half into the test section proper (Fig. 24). For this maneuver, each block

is equipped with two lifting holes (Fig. 22) which mate with male counterparts on a forked lifting bar. Dovetail-type cutouts in the tunnel structure match similar cutouts in the nozzle block sole plates. Tie down units consist of expansion wedges which fit the resulting pattern. A complete change-over from one Mach number to another is normally completed in less than one-half hour.

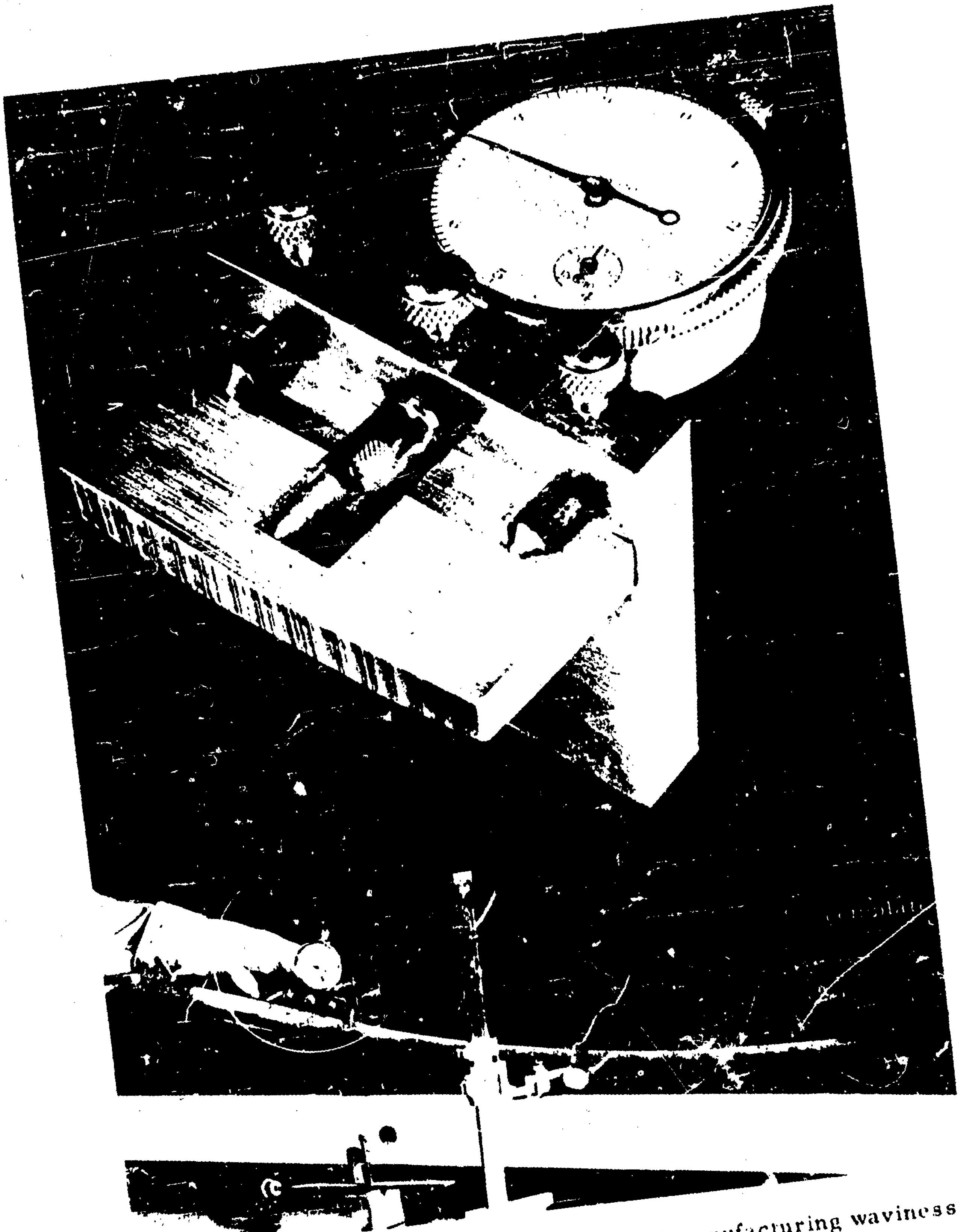

Fig. 20 Instrument used in the control of manufacturing waviness

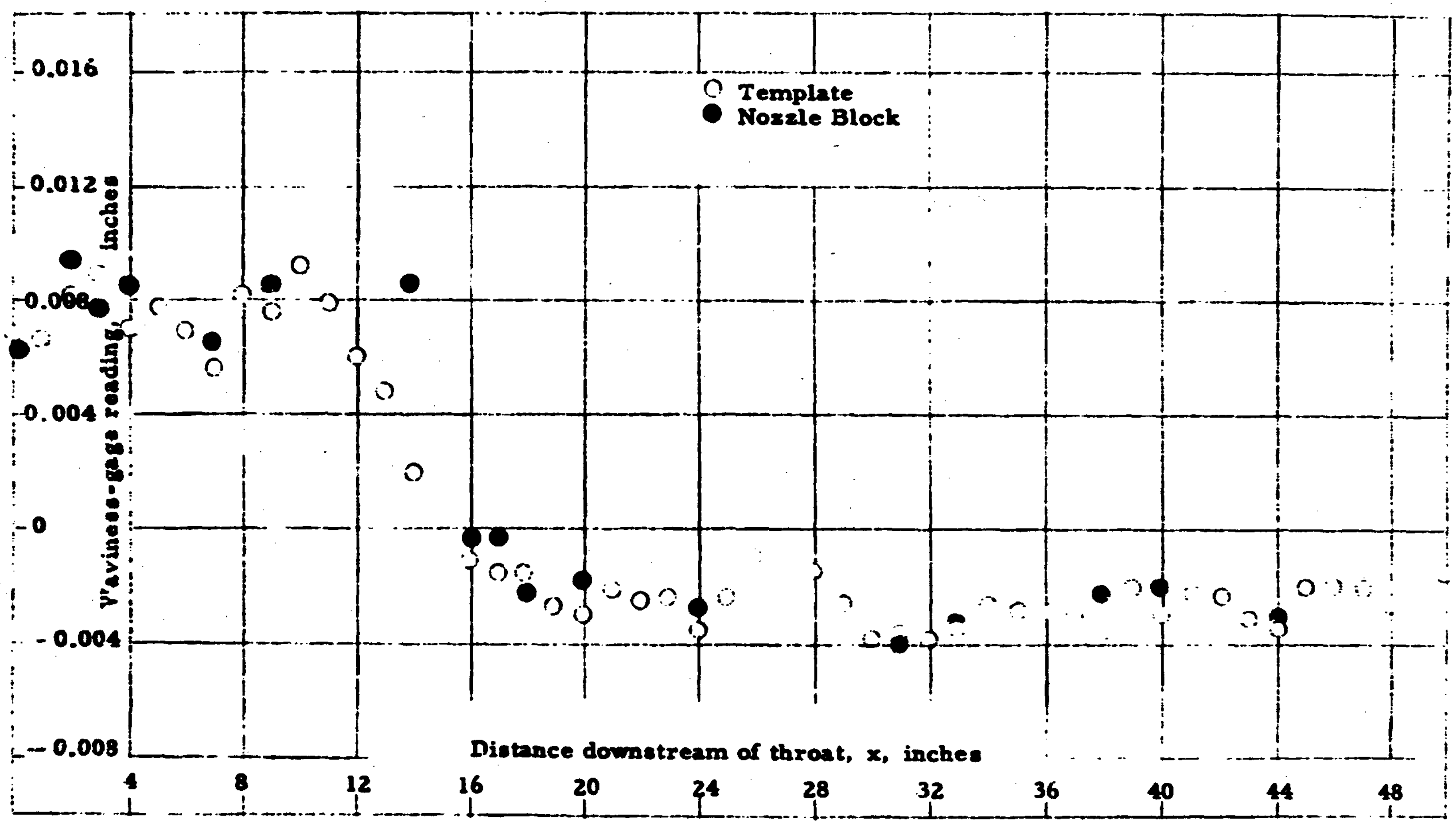

Fig. 21 Waviness distributions downstream of minimum section
(a) M = 2 nozzle

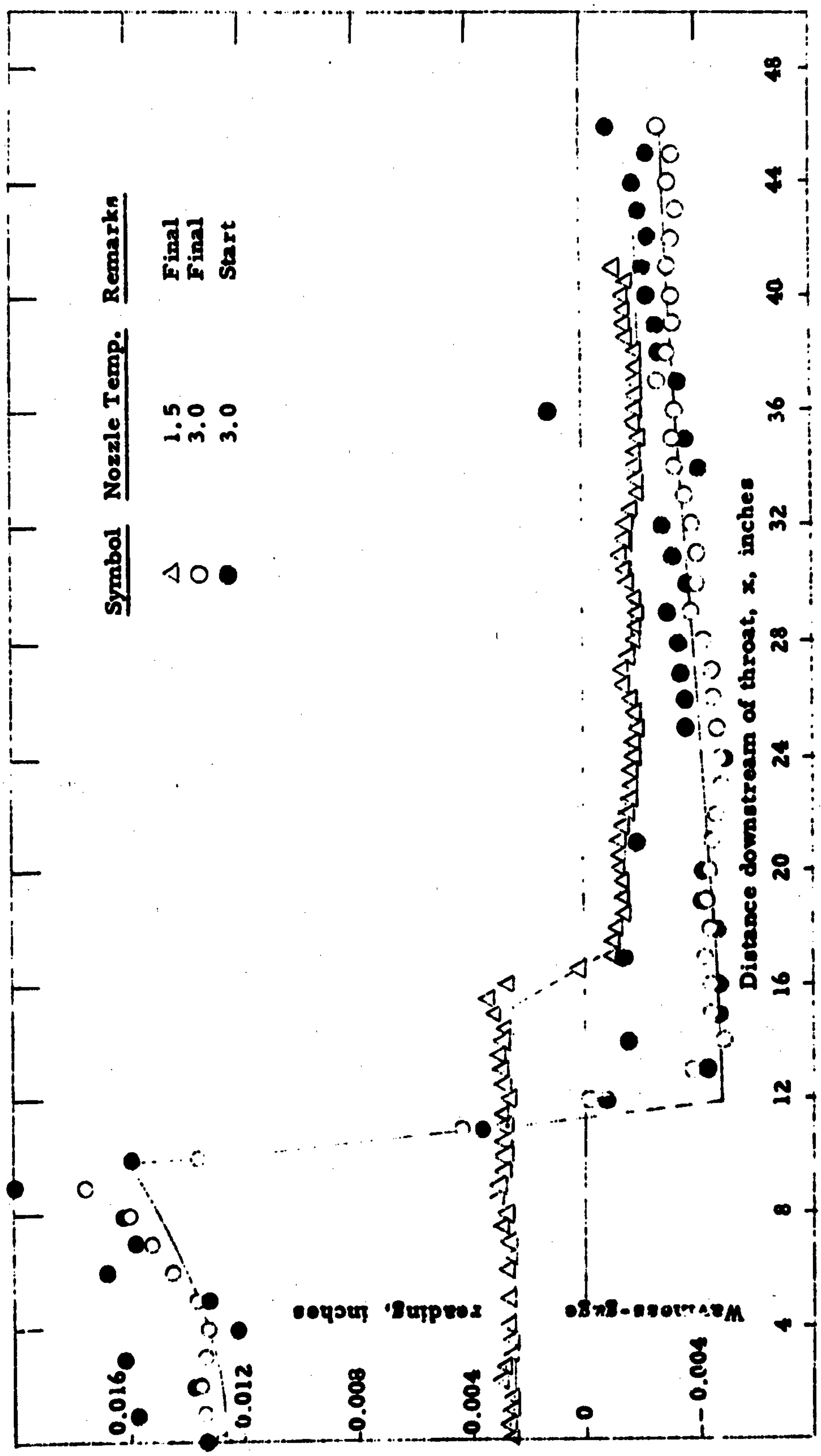

Fig. 21 Waviness distributions downstream of minimum section
(b) M = 1.5 and 3.0 nozzles

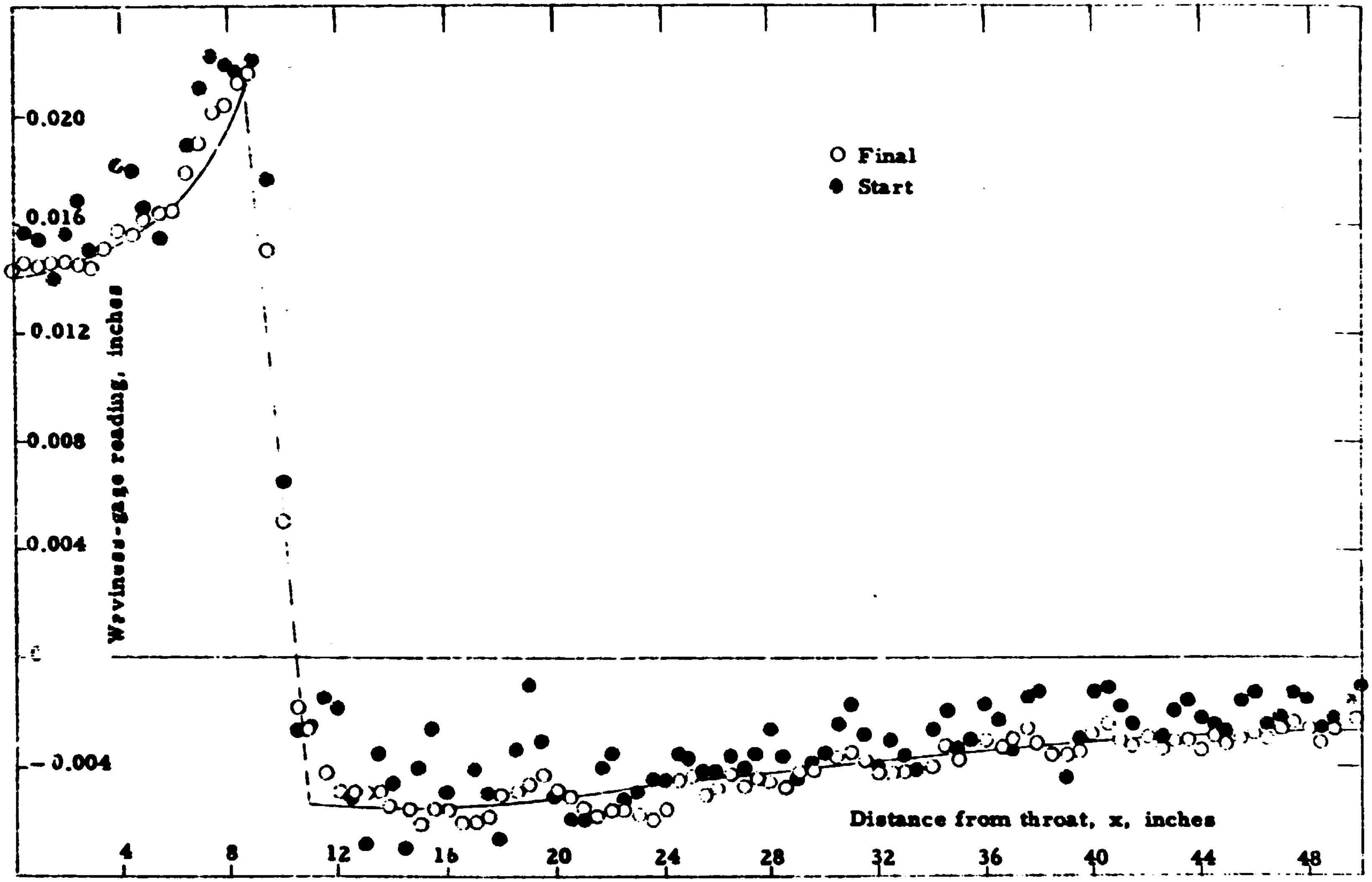

Fig. 21 Waviness distributions downstream of minimum section
(c) M = 3.25 nozzle

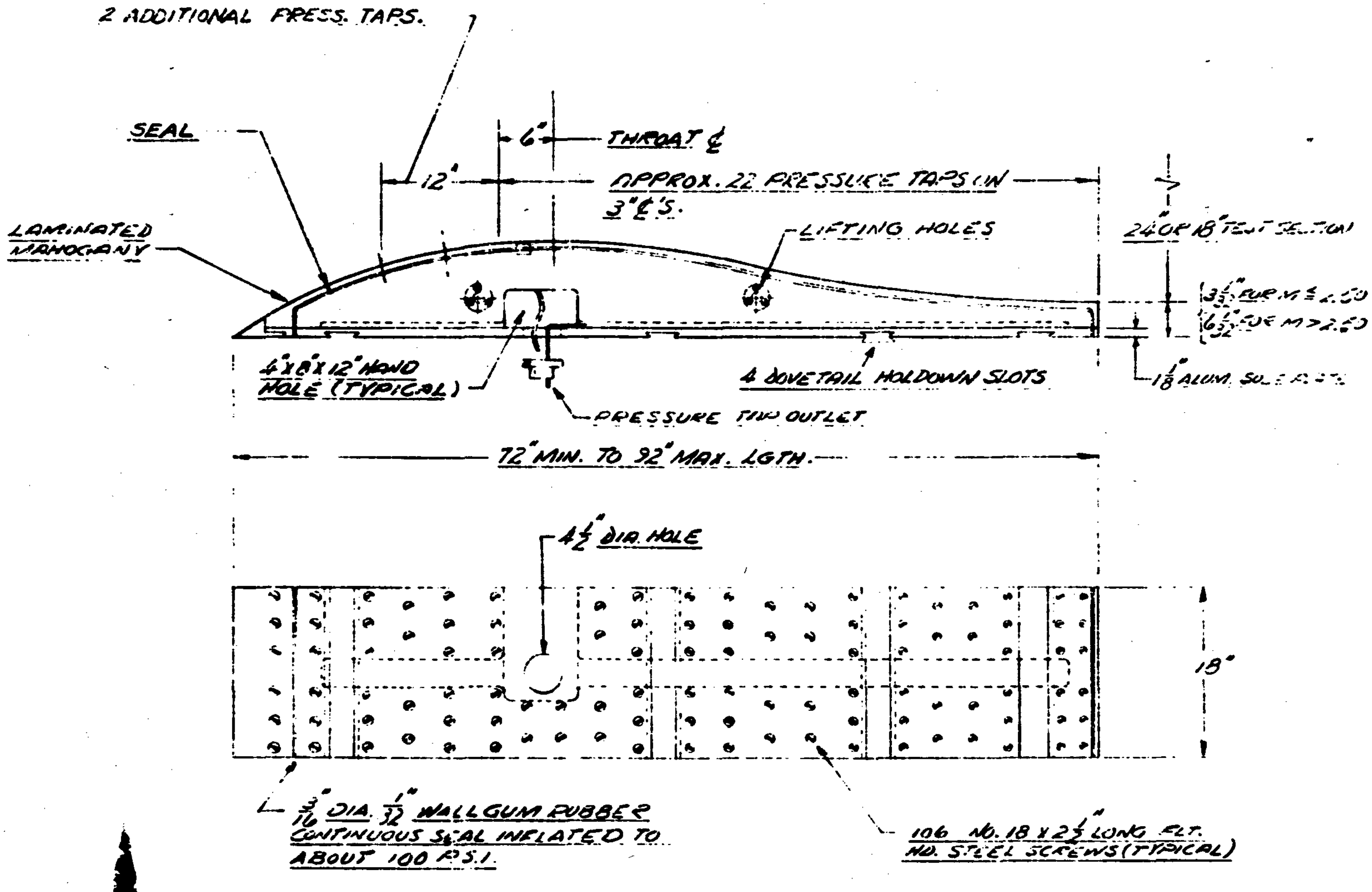

Fig. 22 Typical nozzle block

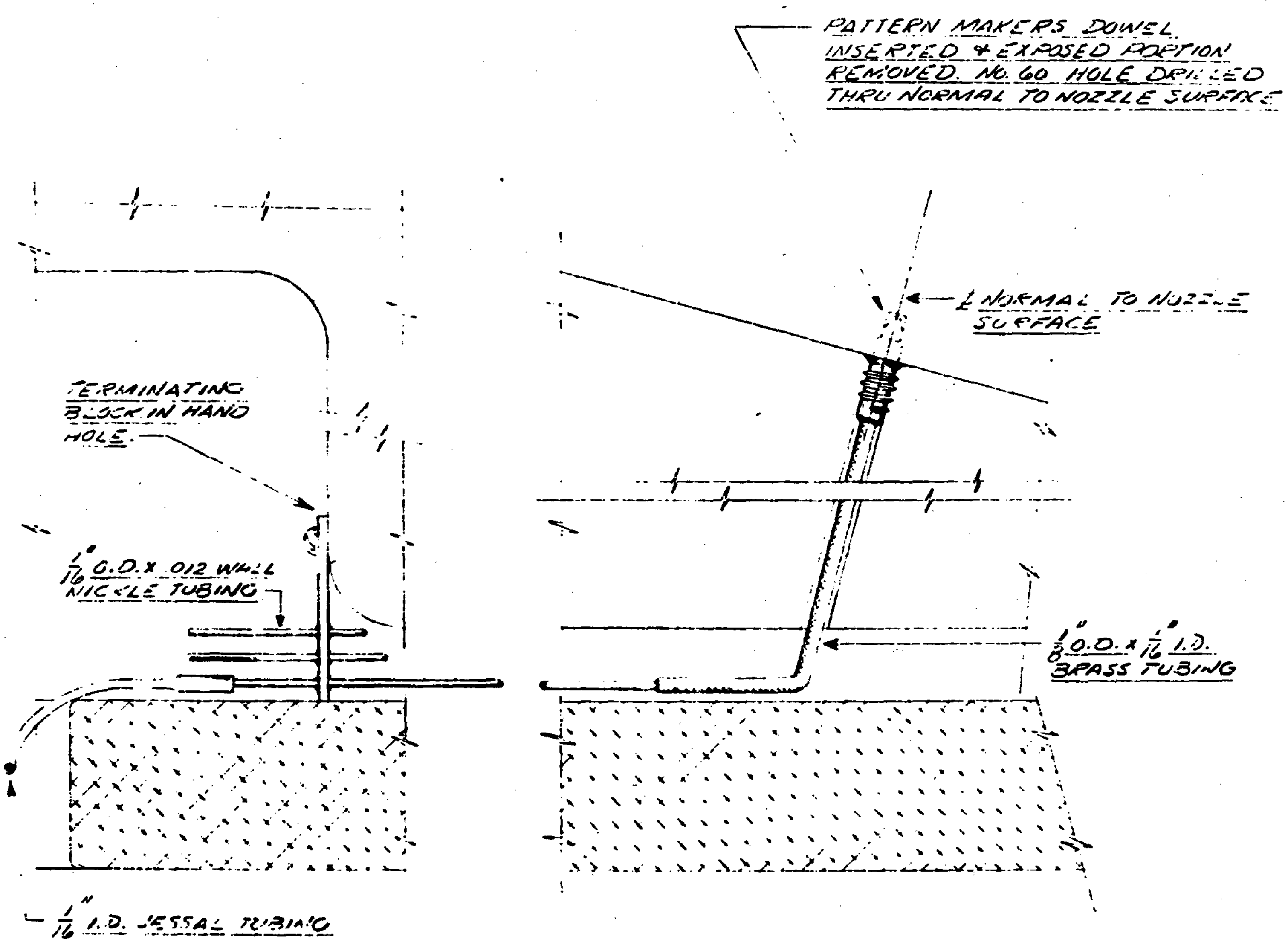

Fig. 23 Typical static-pressure scheme. (Section through middle of lower block)

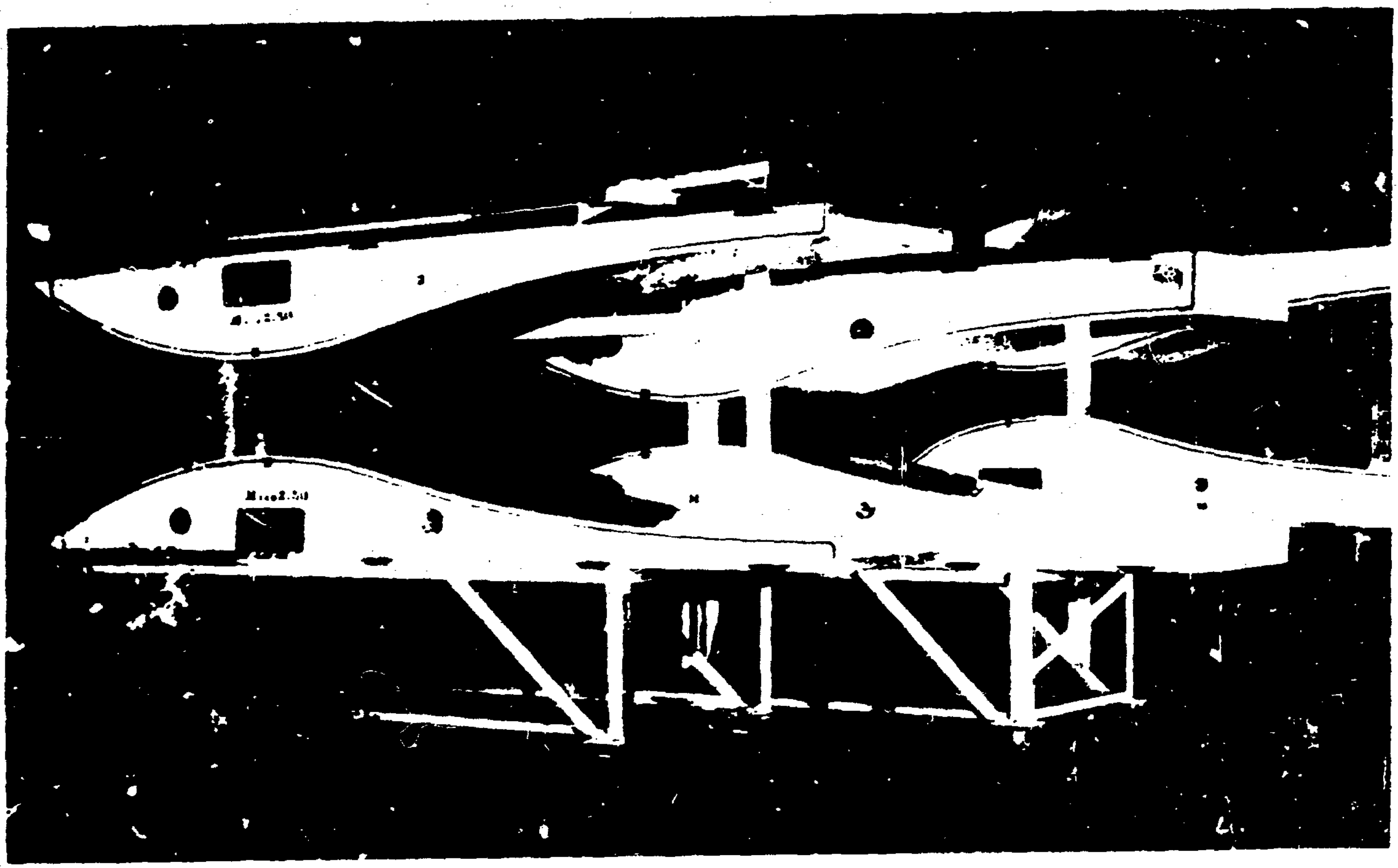

Fig. 2.24 Nozzle blocks on storage racks and during installation
(a) Storage racks

Fig. 24 Concluded
(b) Installation of nozzle blocks

SECTION 9

WAVINESS EFFECTS

An examination of calibration data obtained in the "uniform-flow" region shows three distinct types of discrepancies.

1. The average Mach number is above or below the design value.
2. Long wavelength deviations are superimposed upon the average line.
3. Relatively short wavelength perturbations are superimposed upon the mean distribution.

The present concern is with Item 3, for which a linearized analysis[48] will be shown to provide a suitable approximation useful in the manufacturing stage.

The viscous layer at the boundary is assumed to play only a passive role, with the justification that the reflection properties of a characteristic passing through such a layer are unknown. Experimental data, treated according to the analysis, appear to verify that this is indeed the case.

9.1 The Boundary-Value Problem

The neglect of the boundary layer enables us to consider the two-dimensional wave equation

$$(a^2 - u^2)\Phi_{xx} - 2uv\Phi_{xy} \ (a^2 - v^2)\Phi_{yy} = 0 \qquad (9{:}01)$$

where Φ is the velocity potential such that $u = \Phi_x$ and $v = \Phi_y$ for irrotational flow. Specifically, consider Φ to be the potential function for an "imperfect" contour (i.e., containing waviness) and $\bar{\Phi}$ to be the corresponding potential for the infinitesimally differing "perfect" contour.* Both functions must satisfy Eq. (9:01) as well as the boundary condition

$$\frac{v}{u} = \frac{\Phi_y(x, y)}{\Phi_x(x, y)} = y'(x) \qquad (9{:}02)$$

*The notational use of $\overline{(\ )}$ and $(\ )'$ differs in this section from the earlier use.

or

$$\frac{\bar{v}}{\bar{u}} = \frac{\bar{\Phi}_y(x, \bar{y})}{\bar{\Phi}_x(x, \bar{y})} = \bar{y}'(x) \tag{9:03}$$

on the contour. Since the potentials differ by a small amount

$$\Phi = \bar{\Phi} + \phi(x, y) \tag{9:04}$$

where ϕ is a small perturbation potential. Eq. (9:02) may now be written

$$\frac{\bar{\Phi}_y(x, y) + \phi_y(x, y)}{\bar{\Phi}_x(x, y) + \phi_x(x, y)} = y'(x) \stackrel{\sim}{=} \frac{\bar{\Phi}_y(x, y)}{\bar{\Phi}_x(x, y)} + \frac{\phi_y(x, y)}{\bar{\Phi}_x(x, y)} \tag{9:05}$$

where the approximation follows from the assumption $(\phi_x/\bar{\Phi}_x) \ll 1$.

For further simplification the contours are restricted to $y \stackrel{\sim}{-} \bar{y}$, which does not necessarily imply a corresponding equivalence of the slopes y' and $\bar{y}'$. Inasmuch as $\bar{\Phi}$ and its derivatives are continuous and slowly varying functions (in contrast to ϕ), this restriction leads to

$$\frac{\bar{\Phi}_y(x, y)}{\bar{\Phi}_x(x, y)} = \frac{\bar{\Phi}_y(x, \bar{y})}{\bar{\Phi}_x(x, \bar{y})} = \bar{y}' \tag{9:06}$$

Then from Eqs. (9:05) and (9:06)

$$\phi_y(x, y) = (y' - \bar{y}')\,\bar{\Phi}_x(x, \bar{y}) \tag{9:07}$$

Writing $y(x) = \bar{y}(x) + \varepsilon(x)$ and noting that $\bar{\Phi}_x(x, \bar{y})$ is essentially constant (say, U) over small sections of the contour, the simplified boundary condition for ϕ becomes

$$\phi_y(x, y) = U\varepsilon' \quad . \tag{9:08}$$

The exact boundary condition may be obtained from the left-hand side of Eq. (9:05) without assuming $(\phi_x/\bar{\Phi}_x) \ll 1$; it is

$$\phi_y(x, y) - y'\phi_x(x, y) = U\epsilon' \tag{9:09}$$

and is equivalent to

$$\frac{\partial \Phi}{\partial n} = 0 = \frac{\partial \bar{\Phi}}{\partial n} + \frac{\partial \phi}{\partial n}$$

in which $\partial\bar{\Phi}/\partial n$ is a known function. A unique solution is assured, therefore, since the theory of hyperbolic equations requires that ϕ and ϕ_n be specified along an initial curve and that either ϕ or ϕ_n be known along the boundary. In the present case no waviness is assumed to exist upstream of the inflection point on the contour, so $\phi = \phi_n = 0$ on the initial curve, which is arbitrary but for the requirement that it lie upstream of the design characteristics. The waviness effect is transmitted along characteristics in the "simple-wave" region and shows up as Mach number perturbations on the nozzle axis.

9.2 Linearization

Assume that

$$q = \bar{q} + \tilde{q} \tag{9:10}$$

where

$$q^2 = \Phi_x^{\,2} + \Phi_y^{\,2} \quad ; \quad \bar{q}^2 = \bar{\Phi}_x^{\,2} + \bar{\Phi}_y^{\,2} \quad ; \quad \tilde{q}^2 = \phi_x^{\,2} + \phi_y^{\,2}$$

and $(\tilde{q}/\bar{q}) \ll 1$. With this approximation Eq. (9:01) and its counterpart for the "perfect" contour reduce to

$$(\bar{a}^2 - \bar{u}^2)\phi_{xx} - 2\bar{u}\bar{v}\phi_{xy} + (\bar{a}^2 - \bar{v}^2)\phi_{yy} = \frac{\partial(\bar{q}^2)}{\partial x}\phi_x + \frac{\partial(\bar{q}^2)}{\partial y}\phi_y \tag{9:11}$$

Eqs. (9:11) and (9:09) are an "exact" formulation of small disturbances in a nozzle. However, for the estimation of design tolerances, a simplified form of Eq. (9:11) will be employed. First, assume the coefficients to be constants so that

$$A\phi_{xx} + 2B\phi_{xy} + C\phi_{yy} = D\phi_x + E\phi_y \tag{9:12}$$

where certain average values for $\bar{a}$, etc., are to be taken in

$$A = \bar{a}^2 - \bar{u}^2 \quad ; \quad B = -\bar{u}\,\bar{v} \quad ;$$
$$C = \bar{a}^2 - \bar{v}^2 \quad ; \quad D = 2\bar{q}\,\bar{q}_x \quad ; \quad E = 2\bar{q}\,\bar{q}_y \quad . \tag{9:13}$$

The differential equation for the characteristics[10] is given by

$$A(dy)^2 - 2B(dx\,dy) + C(dx)^2 = 0 \tag{9:14}$$

with the solutions $\lambda(x, y)$ = constant and $\mu(x, y)$ = constant, forming two real families of curves. These are

$$\lambda = y - \beta_1 x = \text{constant}$$
$$\mu = y - \beta_2 x = \text{constant} \tag{9:15}$$

in which

$$\beta_{1,2} = \frac{B \pm \sqrt{B^2 - AC}}{A} = \frac{dy}{dx} \quad .$$

and $\beta_1 < 0$, $\beta_2 > 0$. Replacing (x, y) by (λ, μ) as the independent variables in Eq. (9:12), there results the normal or canonical form[10]

$$\phi_{\lambda\mu} = -\left[a(\lambda, \mu)\phi_\lambda + b(\lambda, \mu)\phi_\mu\right] \tag{9:16}$$

in which

$$a(\lambda, \mu) = \frac{A\lambda_{xx} + 2B\lambda_{xy} + C\lambda_{yy} - D\lambda_x - E\lambda_y}{2\left[A\lambda_x\mu_x + B(\lambda_x\mu_y + \lambda_y\mu_x) + C\lambda_y\mu_y\right]}$$

$$b(\lambda, \mu) = \frac{A\mu_{xx} + 2B\mu_{xy} + C\mu_{yy} - D\mu_x - E\mu_y}{2\left[A\lambda_x\mu_x + B(\lambda_x\mu_y + \lambda_y\mu_x) + C\lambda_y\mu_y\right]}$$

Now in Eq. (9:11), $\partial(\bar{q}^2)/\partial x$ and $\partial(\bar{q}^2)/\partial y$ are several orders of magnitude lower than the coefficients on the left-hand side, and are of opposite sign. Furthermore, the terms ϕ_x and ϕ_y are themselves small quantities.

The two products on the right-hand side may, therefore, be neglected; thus reducing Eq. (9:16) to

$$\phi_{\lambda\mu} = 0 \tag{9:17}$$

which has the general solution

$$\phi = f_1(\lambda) + f_2(\lambda) = f_1(y - \beta_1 x) + f_2(y + \beta_2 x) \tag{9:18}$$

The function f_1 is constant along characteristics with negative slope corresponding to disturbances originating on the upper contour. In like manner f_2 applies to lower wall effects. There is no loss of generality if consideration is given only to f_1, say, since the effects are additive. Eq. (9:08) is the necessary boundary condition.

The use of constant coefficients in the differential equation amounts to replacing curved characteristics by straight characteristics. Due to this simplification, the waviness effect will not be completely correct as to magnitude or position. Still, the analysis does prove to be of value in predicting the order of magnitude of the transmitted disturbance.

9.3 Mach-Number Variation Due to Sinusoidal Waviness

Let us consider a small segment of the "perfect" nozzle contour to be defined by

$$\bar{y} = k(x - x_0) + y_0 \tag{9:19}$$

in the vicinity of x_0, y_0), where $\bar{y}' = k$. Superimpose on this "perfect" contour extremely small sinusoidal waviness such that

$$y = \bar{y} + \varepsilon = k(x - x_0) + y_0 + \sigma \sin [a(x - x_0)] \tag{9:20}$$

and assume a solution of the form

$$\phi = A_1 \sigma \sin [a_1(y - \beta_1 x + b_1)] \tag{9:21}$$

Substituting into Eq. (9:09) and neglecting a higher order term yields

$$\phi = \frac{U\,(k - \beta_1)}{(1 + k\beta_1)} \sin \left\{ \left[\frac{a}{k - \beta_1} \right] \left[(y - y_0) - \beta_1 (x - x_0) \right] \right\} \tag{9:22}$$

so that

$$\tilde{u} = - \frac{a\sigma U\beta_1}{1 + k\beta_1} \cos \left\{ \left[\frac{a}{k - \beta_1} \right] \left[(y - y_0) - \beta_1 (x - x_0) \right] \right\} \tag{9:23}$$

$$\tilde{v} = \frac{a\sigma U}{1 + k\beta_1} \cos \left\{ \left[\frac{a}{k - \beta_1} \right] \left[(y - y_0) - \beta_1 (x - x_0) \right] \right\} \tag{9:24}$$

These perturbation velocities are the result of the waviness $\epsilon(x)$ which induces maximum errors in the coordinates, slope, and curvature of magnitude $|\sigma|$, $|a\sigma|$, and $|a^2\sigma|$. Of especial interest are the slope tolerance, $|a\sigma|$, and the curvature tolerance, $C^* = |a^2\sigma|$, as well as the perturbation wavelength $L^* = (2\pi/a)$. The curvature is readily obtainable with the aid of a waviness gage (Section 8), whereas slope measurements are relatively difficult.

In terms of Mach number, the maximum error from Eq. (9:23) is

$$(\Delta M)_{max} = \left| \frac{a\sigma\beta_1 M}{1 + k\beta_1} \right| \tag{9:25}$$

and noting that $C^* L^* = 4\pi^2\sigma$, the following formulae are obtained:

$$\left(\frac{\Delta M}{M}\right)_{max} = \left| \frac{2\pi\sigma\beta_1}{L^*(1 + k\beta_1)} \right| = \left| \frac{C^* L^* \beta_1}{2\pi(1 + k\beta_1)} \right| \tag{9:26}$$

If the simplified boundary condition of Eq. (9:08) had been utilized, the following results instead:

$$\left(\frac{\Delta M}{M}\right)_{max} = |a\sigma\beta_1| = \left| \frac{2\pi\sigma\beta_1}{L^*} \right| = \left| \frac{C^* L^* \beta_1}{2\pi} \right|$$

$$C^* = \frac{1}{\sigma\beta_1^2} \left(\frac{\Delta M}{M}\right)^2_{max} \tag{9:27}$$

The absence of the factor $(1 + k\beta_1)$ in Eq. (9:27) in contrast to Eqs. (9:25) and (9:26) is not serious. Near the inflection point, where k is a maximum, $(k\beta_1)$ remains relatively constant with a value of about -0.09 for the Laboratory's nozzles. This is due to the fact that as the angle of maximum divergence decreases, the local Mach angle increases at almost the same rate.

Finally, by setting y = 0 in Eq. (9:23), the wavelength, L_A^*, of the Mach-number variation on the axis is

$$L_A^* = \frac{2\,(k - \beta_1)}{a\beta_1} = \left(\frac{k - \beta_1}{\beta_1}\right) L^* \tag{9:28}$$

From Eq. (9:27) it can be seen that for a given frequency (a) and coordinate tolerance (δ) the relative error in Mach number is proportional to β_1 and so varies from nozzle to nozzle. The rather large variation of β_1 with Mach number is shown in Fig. 25. In contrast to this, the ΔM error itself displays a much slower variation. The short tabulation given below illustrates the magnitudes for a coordinate tolerance of 0.005 inches.

$L^{*''}$		M = 1.3	M = 2.5	M = 4.0
1	$\frac{\Delta M}{M}$	0.038	0.014	0.0081
10	$\frac{\Delta M}{M}$	0.004	0.001	0.0008
1	ΔM	0.049	0.034	0.032
10	ΔM	0.005	0.003	0.003

The fact that the error, ΔM, is inversely proportional to the waviness wavelength implies that smoothing the contour decreases the variation of Mach number. Moreover, the curvature, C^*, is proportional to $(\Delta M)^2$, implying a sensitivity to small variations in ΔM. For example, for a

$M = 2.5$ nozzle with $\sigma = 0.005$ inches the maximum allowable error in curvature must be reduced from 0.017 to 0.0002 in order to reduce $(\Delta M)_{max.}$ from 0.01 to 0.001.

As a check on the utility of the method, consider the experimental data (Fig. 26) with regard to test-section Mach number and waviness measurements on the $M = 2.5$ nozzle blocks† of the Naval Supersonic Laboratory. Only the pertinent measurements for this discussion are shown in Fig. 26. The major discrepancies in the calibration are attributed to design errors, while the illustrated high-frequency variation will be traced to the waviness effect. This is consistent with the superposition principle of linear equations.

The $M = 2.5$ nozzle is drawn to scale in Fig. 26 and the perturbation regions indicated in the measurements of M and C^* are denoted by the segments ABC and $A'B'C'$. The locations of A', B', and C' are only approximate inasmuch as we have assumed that Eq. (9:19) is valid (with $(x_0 y_0)$ the inflection-point coordinates) and that the characteristics are straight. However, in spite of the approximations, the pairs AA', BB', and CC' do lie close to the characteristics. Since A', B', C' occur at the inflection points of the curvature oscillation, and A, B, C are the inflection points of M oscillation, it is seen that the perturbations do correspond to propagations along characteristics.

From the curvature data a reasonable value for L^* is 6 inches and it follows from Eq. (9:28) that $L_A^* \approx 10$ inches, in good agreement with the M measurements. With $C^* \cong 0.002$, the coordinate error is $\sigma = 0.0018$ inches which checks with the general accuracy of the nozzle fabrication. The Mach-number perturbation from the above analysis is $(\Delta M)_{max} \cong 0.002$ for the contribution from one contour and, on the basis of similar curvature variations for each block (Fig. 26), the total $(\Delta M)_{max} \cong 0.004$. This accounts for more than one half of the amplitude of the dashed curve in Fig. 26. A somewhat more accurate result was obtained by similar computations on a $M = 1.7$ nozzle.

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† Note that in this design only up to η^4 terms were employed in the Friedrichs method.

It is apparent that some of the discrepancy in the above check may be due to an inexact choice of the basic Mach-number distribution in attempting to isolate the waviness influence. In addition, the assumption of sinusoidal variations, the choice of L^*, and the linearization process itself, are all inexact. However, in spite of the limitations, a useful prediction of magnitude and location does result in a simple fashion and should be of value in setting up standards to be met by the manufacturer.

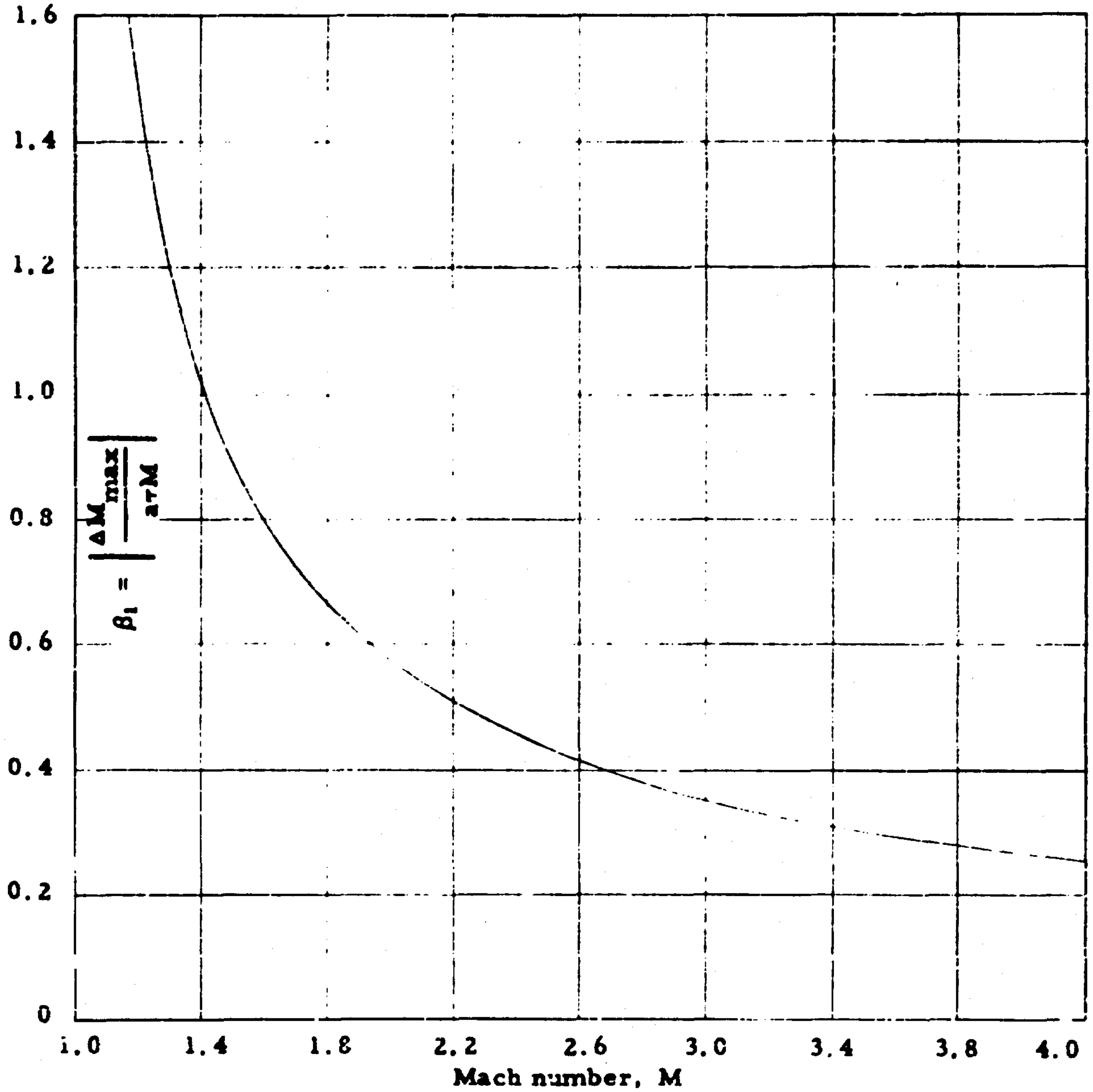


Fig. 25 Characteristic slope as a function of Mach number

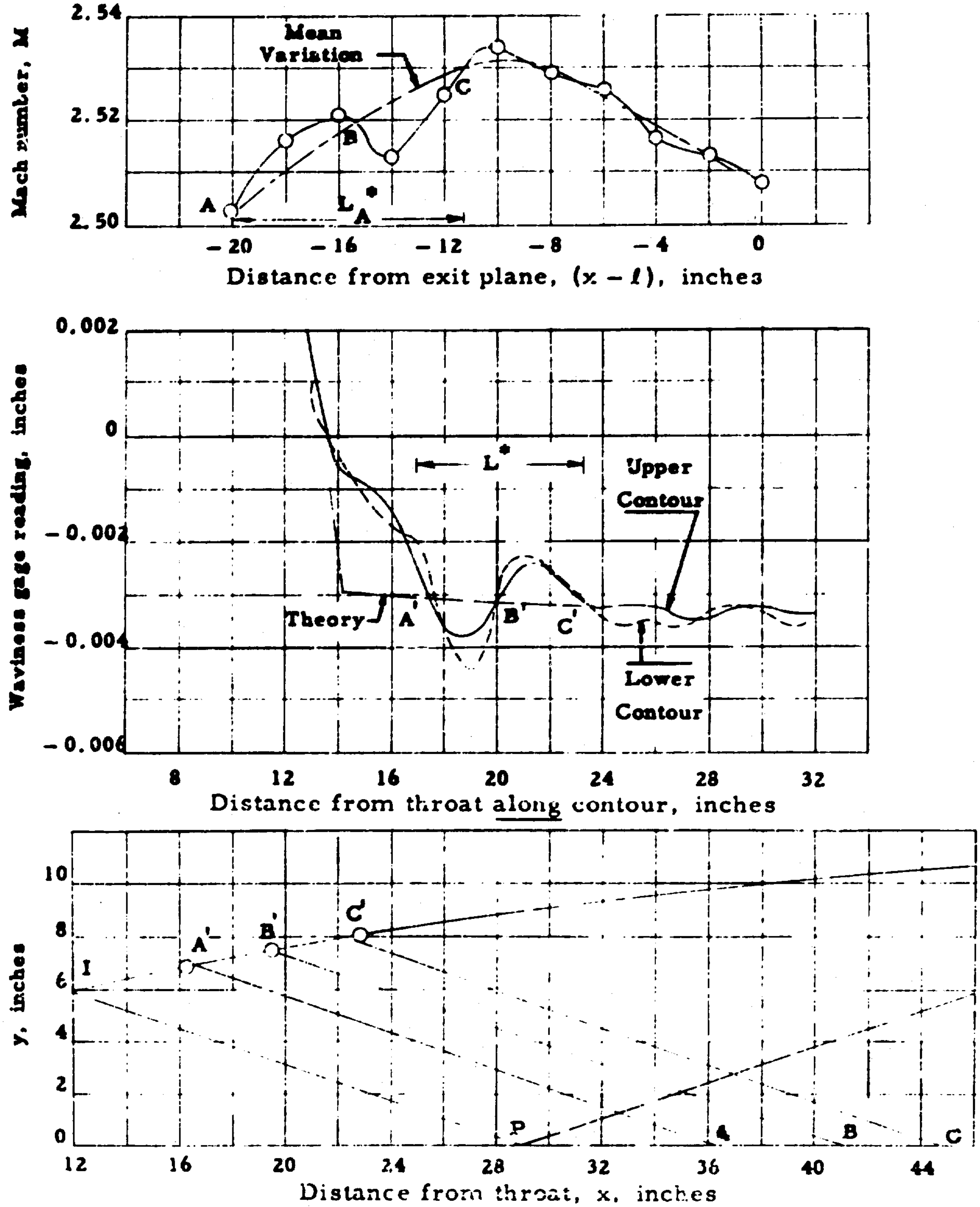


Fig. 26 Correspondence of contour waviness with Mach-number perturbations on the test-section axis

SECTION 10

CALIBRATION METHODS AND SENSITIVITIES

Several methods exist for evaluating the performance of a nozzle in terms of Mach number and flow inclination variations* in the "uniform-flow" region, and boundary-layer parameters. The most common of these make use of pressure measurements, but density, temperature, mass-flow, and wave-geometry measurements do serve some purposes.[41] A specific choice depends upon the Mach-number range, pressure level, required accuracy, and relative simplicity.

As a measure of relative worthiness, the sensitivities for several methods have been compiled in the form of fractional error in the sought parameter relative to fractional error in the measured quantity. After a brief outline of the methods and some of the associated difficulties, the calibration equipment in use at the NSL is described.

10.1 Mach-Number Measurement

Pressure schemes for determining M involve such geometrically simple probes as a pitot tube, flat plate, wedge, and/or cone. The derivation of the pertinent equations are well known[41] and so are not repeated here. In each instance, only the dependence of the measured parameter upon Mach number will be given, followed by the measurement sensitivity. The latter variation** with M is shown in Fig. 27a while actual ΔM values for estimated measurement accuracies of 0.02 psia are given in Fig. 27b and c.

Free-stream static pressure, as measured on a flat plate, in combination with the operating stagnation pressure and an assumption of isentropic flow, yields

$$\frac{p_0}{p^0} = \left[1 + \frac{\gamma - 1}{2} M^2\right]^{\gamma/(\gamma-1)} = P_1 \qquad (10:01)$$

*A method for estimating the effect of non-uniform flow upon stability-test data is outlined in Appendix III.

**Note that $d(P_i^{-1})/(P_i)^{-1} = -dP_i/P_i$.

and so:

$$\frac{\Delta M}{M} = \frac{1 + \frac{\gamma - 1}{2} M^2}{\gamma M^2} \frac{\Delta P_1}{P_1} = \frac{5 + M^2}{7M^2} \frac{\Delta P_1}{P_1} \tag{10:02}$$

Substituting a pitot measurement for the static pressure implies combining Rayleigh's formula with Eq. (10:01):

$$\frac{p_0}{p_p} = \left[\frac{2\gamma}{\gamma + 1} M^2 - \frac{\gamma - 1}{\gamma + 1}\right]^{1/(\gamma-1)} \left[\frac{2 + (\gamma - 1)M^2}{(\gamma + 1)M^2}\right]^{\gamma/(\gamma-1)} = P_3 \tag{10:03}$$

and so:

$$\frac{\Delta M}{M} = \frac{[2\gamma M^2 - (\gamma - 1)][2 + (\gamma - 1)M^2]}{4\gamma(M^2 - 1)^2} \frac{\Delta P_3}{P_3} = \frac{7M^4 + 34M^2 - 5}{35(M^2 - 1)^2} \frac{\Delta P_3}{P_3} \tag{10:04}$$

Rayleigh's formula may be used directly with local measurements of pitot and static pressures

$$\frac{p^r}{p_p} = \left[\frac{\frac{2\gamma}{\gamma + 1} M^2 - \frac{\gamma - 1}{\gamma + 1}}{\left(\frac{\gamma + 1}{2} M^2\right)^{\gamma}}\right]^{1/(\gamma-1)} = P_5 \tag{10:05}$$

and so:

$$\frac{\Delta M}{M} = \left[\frac{\gamma(2M^2 - 1) + 1}{2\gamma(1 - 2M^2)}\right] \frac{\Delta P_5}{P_5} = \frac{7M^2 - 1}{7(1 - 2M^2)} \frac{\Delta P_5}{P_5} \tag{10:06}$$

Introducing the static pressure on a wedge combined with stagnation pressure:

$$\frac{p_w}{p_0} = \frac{2\gamma(M \sin\beta_s)^2 - (\gamma - 1)}{(\gamma + 1)\left(1 + \frac{\gamma - 1}{2} M^2\right)^{\gamma/(\gamma-1)}} = i\,, \tag{10:07}$$

The shock angle is $\beta_s - \beta_s$(M, wedge semi-angle) and

$$\frac{\Delta M}{M} = \left[\frac{Mf_1'}{p_w/p^0} + \frac{\gamma M}{1 + \frac{\gamma - 1}{2} M^2}\right]^{-1} \frac{\Delta P_7}{P_7} \qquad (10:08)$$

$f_1'(M) = d(p_w/p^0)/dM$ follows from tabulated data.

Wedge static pressure and pitot pressure result in

$$\frac{p_w}{p_p} = \frac{[2\gamma(M \sin\beta_s)^2 - (\gamma - 1)]\left[\frac{2\gamma}{\gamma + 1}M^2 - \frac{\gamma - 1}{\gamma + 1}\right]^{1/(\gamma-1)}}{\left[\frac{\gamma + 1}{2}M^2\right]^{\gamma/(\gamma-1)}} = P_9 \qquad (10:09)$$

and so

$$\frac{\Delta M}{M} = \left[\frac{f_1'M}{p_w/p^0} + \frac{2\gamma(1 - 2M^2)}{\gamma(2M^2 - 1) + 1}\right]^{-1} \frac{\Delta P_9}{P_9} \qquad (10:10)$$

When a cone is used in place of a wedge, one must resort to tabulated solutions.[42] If p_c is the cone surface pressure, and

$$g\left(M, \frac{p_c}{p^0}\right) = M \frac{p_0}{p_c} \frac{d(p_c/p^0)}{dM}$$

is obtained from the mentioned reference, then

$$\frac{\Delta M}{M} = \left[g - \frac{7M^2}{5 + M^2}\right]^{-1} \frac{\Delta P_{11}}{P_{11}} \qquad (10:11)$$

where $P_{11} = p_c/p_0$. Also

$$\frac{\Delta M}{M} = \left[g + \frac{7(1 - 2M^2)}{7M - 1}\right]^{-1} \frac{\Delta P_{12}}{P_{12}} \qquad (10:12)$$

where $P_{12} = p_c/p_p$.

In place of pressure one can measure shock angles on a wedge with the aid of a schlieren or shadowgraph system. The Mach number is a function of the shock angle, β_s, and the wedge semi-angle, θ_s:

$$M^2 = \left[\sin^2\beta_s - \frac{\gamma + 1}{2} \frac{\sin\beta_s \sin\theta_s}{\cos(\beta_s - \theta_s)}\right]^{-1} \qquad (10:13)$$

and

$$\frac{\Delta M}{M} = -\beta_s M^2 \left[\cos\beta_s \sin\beta_s - \frac{\gamma+1}{8} \frac{\sin 2\theta_s}{\cos^2(\beta_s - \theta_s)}\right] \frac{\Delta\beta_s}{\beta_s} \tag{10:14}$$

When the wedge angle, θ_s, approaches zero, the above reduces to a simple Mach wave

$$M = (\sin\alpha)^{-1} \tag{10:15}$$

and

$$\frac{\Delta M}{M} = -(\alpha \cot\alpha) \frac{\Delta\alpha}{\alpha} \tag{10:16}$$

The measurement estimates of Figs. 27a and b are based upon $\Delta\beta_s = 0.1^\circ$.

Another point-measurement technique employs a mass-flow probe and a pitot tube. If the mass-flow rate is denoted by w and the corresponding area by A, then

$$\frac{w\sqrt{T_0}}{p_p A} = \left(1 + \frac{\gamma-1}{2} M^2\right)^{1/2[(\gamma+1)/(\gamma-1)]} \left(\frac{2\gamma}{\gamma+1} M^2 - \frac{\gamma-1}{\gamma+1}\right)^{1/(\gamma-1)} \times \left[\frac{2+(\gamma-1)M^2}{(\gamma+1)M^2}\right]^{\gamma/(\gamma-1)} \tag{10:17}$$

Now if $w/p_p = P_{17}$, the measurement sensitivity is

$$\frac{\Delta M}{M} = \left\{\frac{(\gamma+1)M^2}{2+(\gamma-1)M^2} + \frac{4\gamma(M^2-1)^2}{[2\gamma M^2 - (\gamma-1)][2+(\gamma-1)M^2]}\right\}^{-1} \frac{\Delta P_{17}}{P_{17}}$$

$$= \left[\frac{7M^6 + 69M^4 + 165M^2 - 25}{42M^6 + 239M^4 + 110M^2 - 175}\right] \frac{\Delta P_{17}}{P_{17}} \tag{10:18}$$

The interferometer has enjoyed success in small tunnels and recently an ionization technique has been developed.[43] However, the former is

impractical for large-scale work and the latter does not achieve a point measurement. In principle, a calibrated total-temperature probe (i.e., with known recovery-factor dependence upon M and RN, see Eq. (7:08)) may be of use, but in practice, the recovery factor is rarely known to a sufficient degree of accuracy.

10.2 Flow Inclination

Wedges and cones are also of use in determining flow inclination, due to the surface-pressure differences arising when the probe is not aligned with the flow. For example, in the case of the wedge

$$\alpha = \frac{\Delta(p_w)}{(\gamma p^0 M^2)} \left(\frac{1}{C_1 + 2C_2\theta} \right) \tag{10:19}$$

where the C_i are Busemann Coefficients.[41] However, both for the wedge and the cone, the sensitivity increases sharply as $\alpha \rightarrow 0$, as can be seen from

$$\frac{\Delta\alpha}{\alpha} = \frac{\Delta(\Delta p)}{\Delta p} \tag{10:20}$$

On the other hand, the slope of the Δp versus α curve at $\alpha = 0^{\circ}$ does supply a practical calibration method for inclination. Fig. 28 illustrates the variation of $d[\Delta p/p_0]/d\alpha$ with Mach number for a $\theta_s = 10^{\circ}$ wedge and compares the inviscid theory with NSL wedge-calibration data in which the wedge was rotated about its leading edge.

Lastly, a knowledge of Mach number and shock angle permits the inverse use of Eq (10:13) to determine an apparent θ_s and therefore, α.

10.3 Boundary-Layer Parameters

Information as to the viscous state at the boundary is of interest for both future nozzle designs and sidewall-mount test programs. The reduction formulas for the displacement and momentum thicknesses on the basis of constant static pressure and stagnation temperature through the layer are:

$$\delta^* = \int_0^{\delta} \left(1 - \frac{\rho u}{\rho^0 U}\right) dy = \int_0^{\delta} \left[1 - \frac{M}{M^0}\left(\frac{5 + M^2}{5 + M^{0^2}}\right)^{1/2}\right] dy$$

and (10:21)

$$\theta = \int_0^{\delta} \frac{\rho u}{\rho^0 U}\left(1 - \frac{u}{U}\right) dy = \int_0^{\delta}\left[\frac{M}{M^0}\left(\frac{5 + M^2}{5 + M^{0^2}}\right)^{1/2} - \left(\frac{M}{M^0}\right)^2\right] dy$$

It follows that a pitot survey normal to the boundary is sufficient for computing δ^* and θ. For turbulent profiles, a log-log plot of (u/U) as a function of height from the wall establishes the thickness δ as the intersection of a straight line through the data with (u/U) = 1. From all indications the implied assumption of a power-law profile of the form

$$\frac{u}{U} = \left(\frac{y}{\delta}\right)^{1/N} \qquad (10:22)$$

is valid. In any event, an exact value for δ is not of extreme importance.

10.4 Practical Difficulties

Although supersonic flow eases some of the problems associated with disturbed conditions due to the presence of a probe, these problems are not always absent. In addition, some question always exists as to the matching of the probe geometry to the assumptions explicit in Section 10.1. Several investigators, for example, have recently reported apparent stagnation-pressure losses between the stilling and test regions. The loss is said to increase with Mach number to approximately 3 percent at $M \cong 3$, based upon measurements carried out with static and impact pressure probes.

A check on p_0 loss was carried out by Hill† at the NSL, using a point-measurement technique. He aligned a pitot tube with the surface of a wedge and inserted the assembly into a M = 3.5 stream at an attitude such that $(d\beta_s/dM) = 0$ for the estimated Mach number. Measurements were made with the pitot at several distances behind the leading-edge shock and extrapolated forward to the shock position to minimize any

† Results to be published

viscous effect from the wedge surface. The shock angle was determined from enlarged schlieren pictures, and a pitot-tube reading was taken at the extrapolated position without the wedge being present. The results indicate no loss in p_0 at $M \cong 3.5$ with an estimated accuracy of about 0.1 percent. The earlier-mentioned losses in other facilities may be due to reflecting waves introduced at the nozzle contour, or perhaps to the difficulties inherent in static-pressure measurements.

A further independent p_0 measurement that does not use a static pressure is furnished by Eq. (10:17). The accuracy required, however, demands either an extremely accurate mass-flow meter, or a large reservoir for storing the entering air.

Since a pitot pressure is assumed analytically to be the final stagnation pressure after a normal shock wave, the shape of the bow wave ahead of the probe is important. In terms of probe geometry, the implication is that the inner-outer diameter ratio, (d/D), should be small. At $1.6 \leq M \leq 1.8$, it was found that for $0.062 \leq (d/D) \leq 0.50$ the results are independent of the ratio.[44] The same reference indicates that the measurement is independent of angle of attack up to 11 degrees for d/D = 0.50 (NSL value).

Static-pressure measurements demand some compensation for the boundary-layer effect when introducing the standard oblique-shock relations for wedges or cones (see Fig. 28). The pressure at a tap a finite distance aft of the leading edge of a wedge is in addition influenced by the edge segment within the tap forecone. Non-uniformities in flow and viscous effects, therefore, hamper the interpretation of such data.

Barnet[45] described a technique to compensate for these effects. Static-pressure taps, in both a rotatable wedge and the tunnel ceiling, are used, the ceiling taps are read with and without the wedge present, and are situated such that the oblique shock from the wedge intersects the boundary just upstream of the tap. When the wall tap reads the same pressure with the wedge at a given attitude as with the wedge removed, the probe influence is considered to be nil and its tap pressure as valid (i.e., free-stream static pressure). However, this technique is quite involved and not too easily adapted to over-all calibrations.

An ogive-cylinder combination is sometimes used to find static pressure far aft of the nose, but a nose shock is present. Static pressures also suffer from dew-point effects. At a dew-point of about $0^{\circ}F$ and $1.7 \leqslant M \leqslant 4.0$, the pressure is approximately 2 percent higher than corresponding values when no condensation shock occurs.[46]

10.5 NSL Calibration Equipment

To avoid static-pressure problems, the NSL Mach-number probe consists of a 33-tube pitot rake (hypodermic tubing 0.035-inch O.D., 0.5-inch lateral spacing) mounted on a wedge base of 17-inch span, and used in conjunction with stagnation pressure (Fig. 30). The rake is movable axially by remote control over a large range of the theoretical "uniform-flow" region. Downstream travel is limited by the ceiling support system position which, however, serves to hold models under test and is, therefore, aft of the practical test region. Upstream travel allows investigation to a point 21 inches ahead of the nozzle exit plane.

The rake may be positioned in either a horizontal or vertical attitude, and, by means of offset adapters, planes $\pm$ 2 inches from the axis may be surveyed.

For flow inclinations, a 10-degree vertex semi-angle wedge with 33 pairs of pressure taps (0.020-inch O.D.) on the upper and lower surfaces is available. The configuration, support arrangement, and mobility are similar to that of the above rake. Theoretical values of $d(\Delta p/p_0)/d\alpha$ at $\alpha = 0$ underestimate the true angle of attack corresponding to a measured pressure difference, as is shown in Fig. 28. The experimental values in the latter figure were obtained as averages of span-wise distributions of $d(\Delta p/p_0)/d\alpha$ for each pair of taps (Fig. 29). An individual data point in Fig. 29 represents the best slope through experimental results taken at intervals of $\Delta\alpha = 1/4$ degree over a range of $\pm$ 1-1/2 degrees.

A correction for the viscous effect shown in Fig. 28 has been estimated as follows: For the Reynolds number based upon the tap distance aft of the leading edge of the wedge, the local displacement thickness, δ^*, at the tap is found from

$$H^* = \frac{\delta^*}{\theta^*} = 2.60 + 0.72\,M^2 \qquad (10:22)$$

where θ^* corresponds to the RN on an incompressible basis. Eq. (10:22) agrees very well with the variation of Fig. 40b for M = 8. In the case of the M = 3 calibration, the effective wedge semi-angle is increased by 0.8 degrees and the resulting comparison is

BASIS	$[d(\Delta p/p_0)/d\alpha]$ per degree
theory, inviscid	0.00741
theory, viscous	0.00760
experimental average	0.00768

A fair approximation for the viscous effect in this method is therefore possible.

Boundary-layer profiles have been obtained with the aid of the support shown in Fig. 30 for measurements on the block surface and on the observation windows. Sidewall profiles upstream of the window were taken with hypodermic tubing inserted through the test-section door, and throat positions on the blocks were investigated by insertion of tubing through a convenient pressure tap above the block hand-access hole (Fig. 22). The probe tips were 0.020-inch O. D.

Cone and Wedge semi-angle = 5 degrees
$\gamma = 1.4$

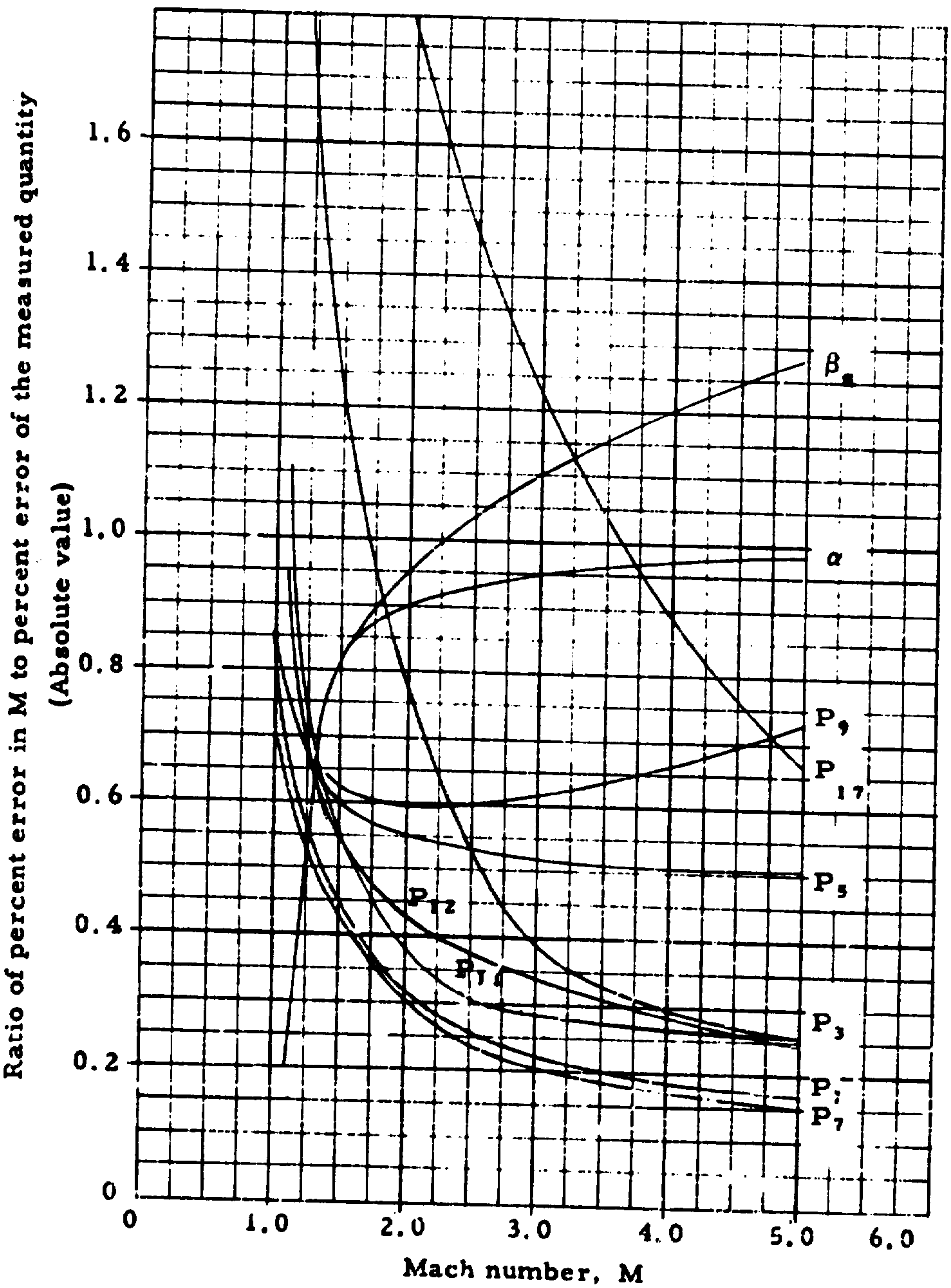
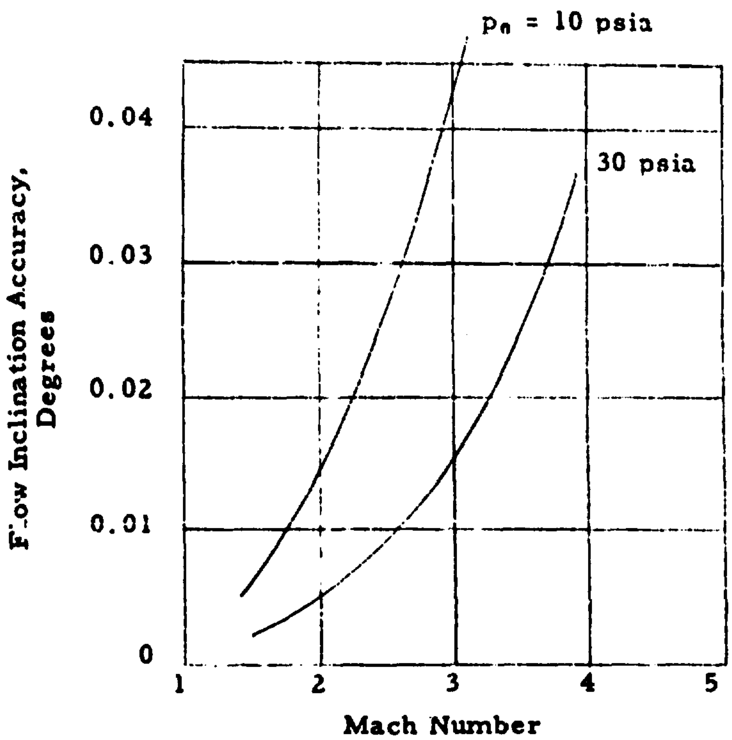
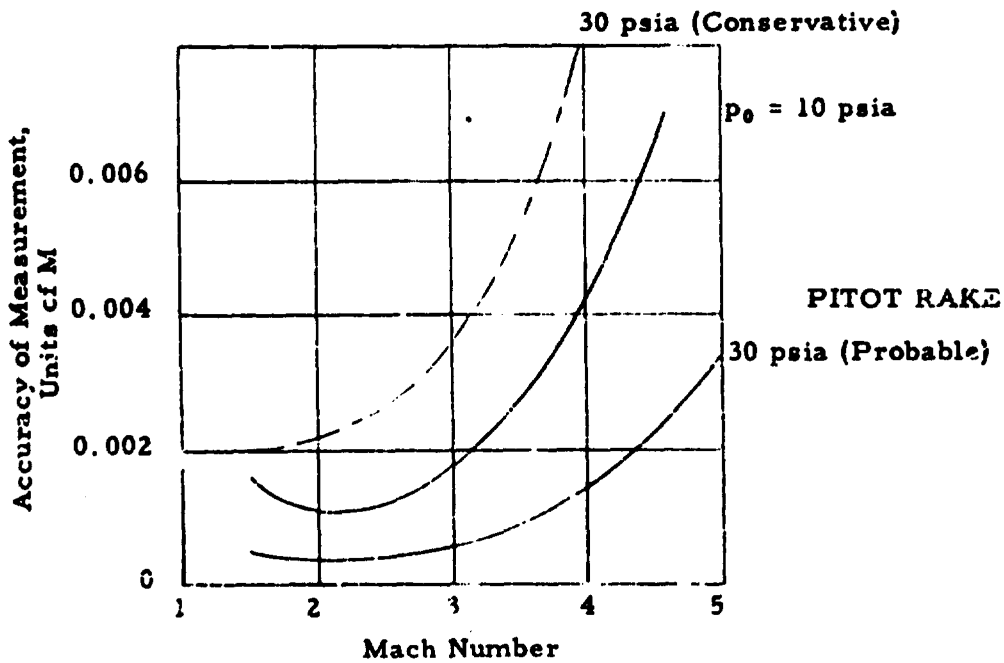


Fig. 27(a) Measurement sensitivities for determina- of Mach number and flow inc! nation



WEDGE



PITOT RAKE

Fig. 27(b) NSL Estimates

p_0 = 30 psia
Wedge semi-angle = 5 degrees
Error in pressure measurements assumed to be 0.02 psia
Error in shock angle measurements assumed to be 0.1 degree

$\gamma = 1.4$

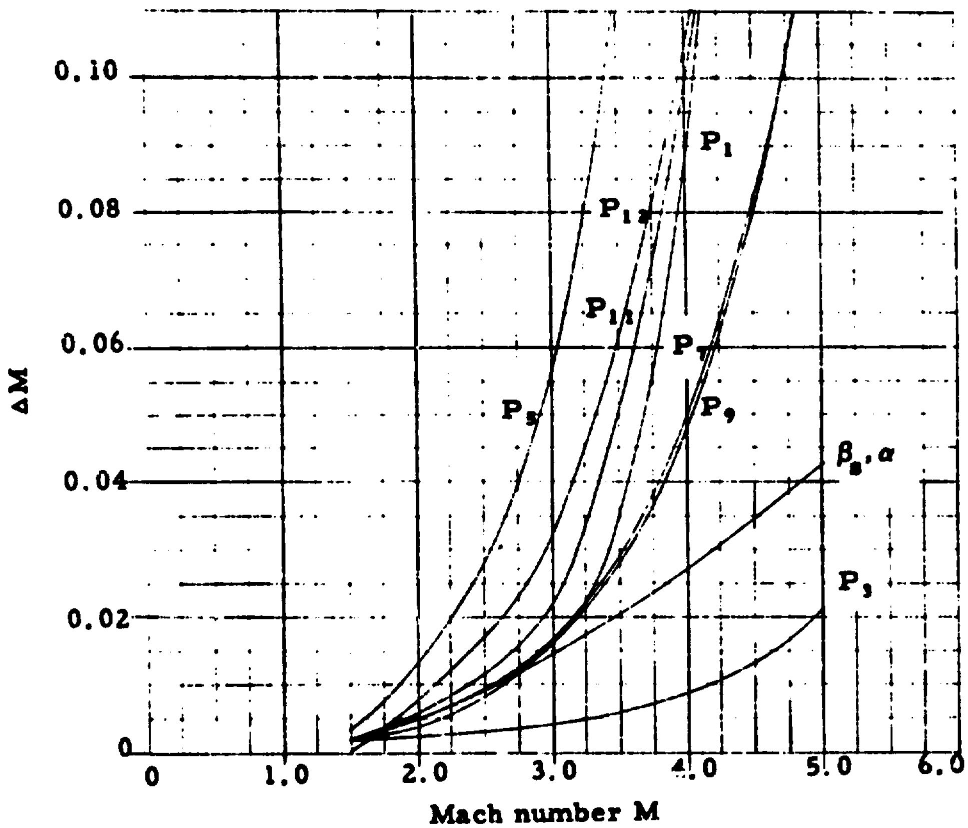


Fig. 27(c) General

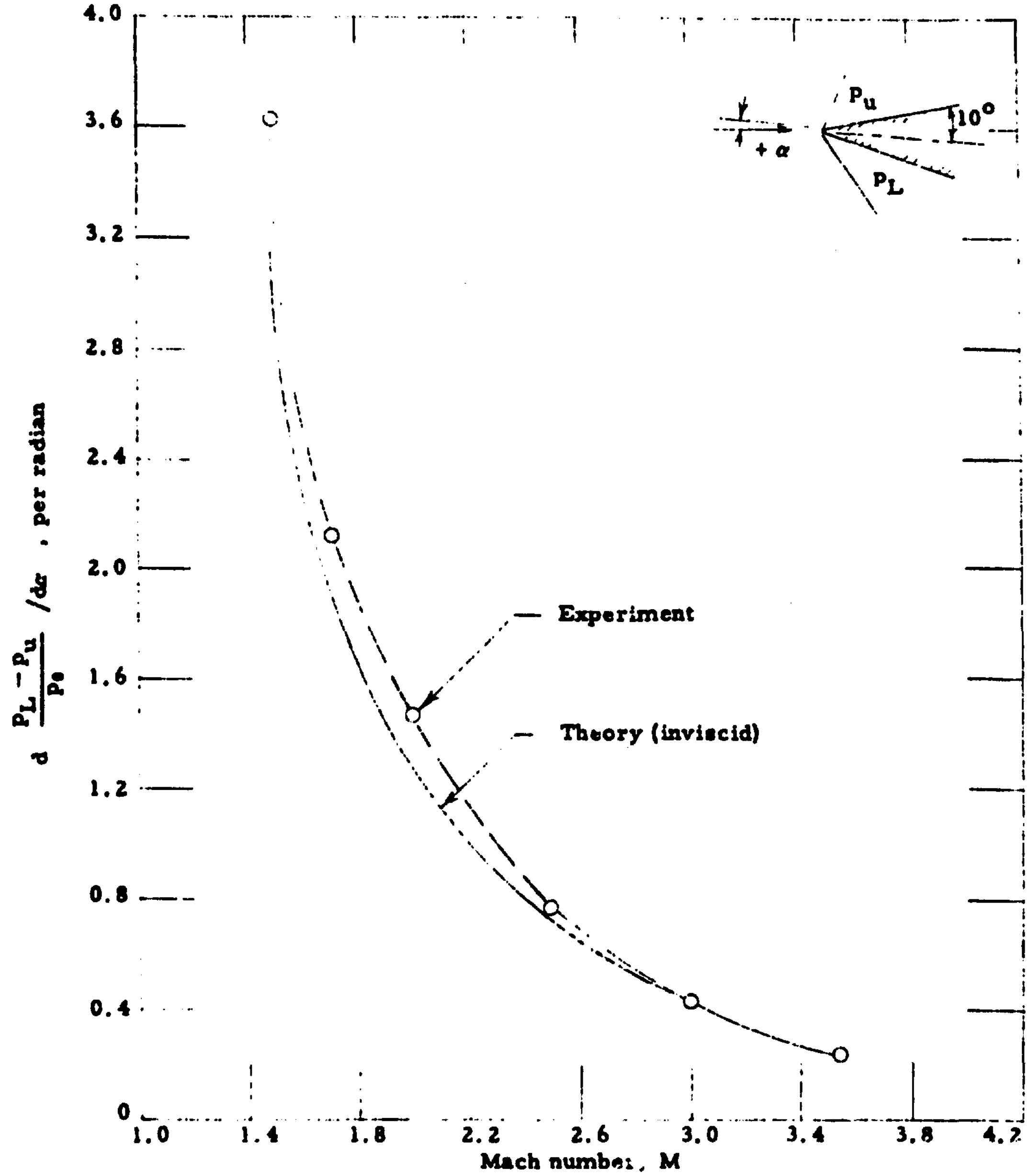


Fig. 28 Comparison of theoretical and experimental wedge-pressure difference slopes

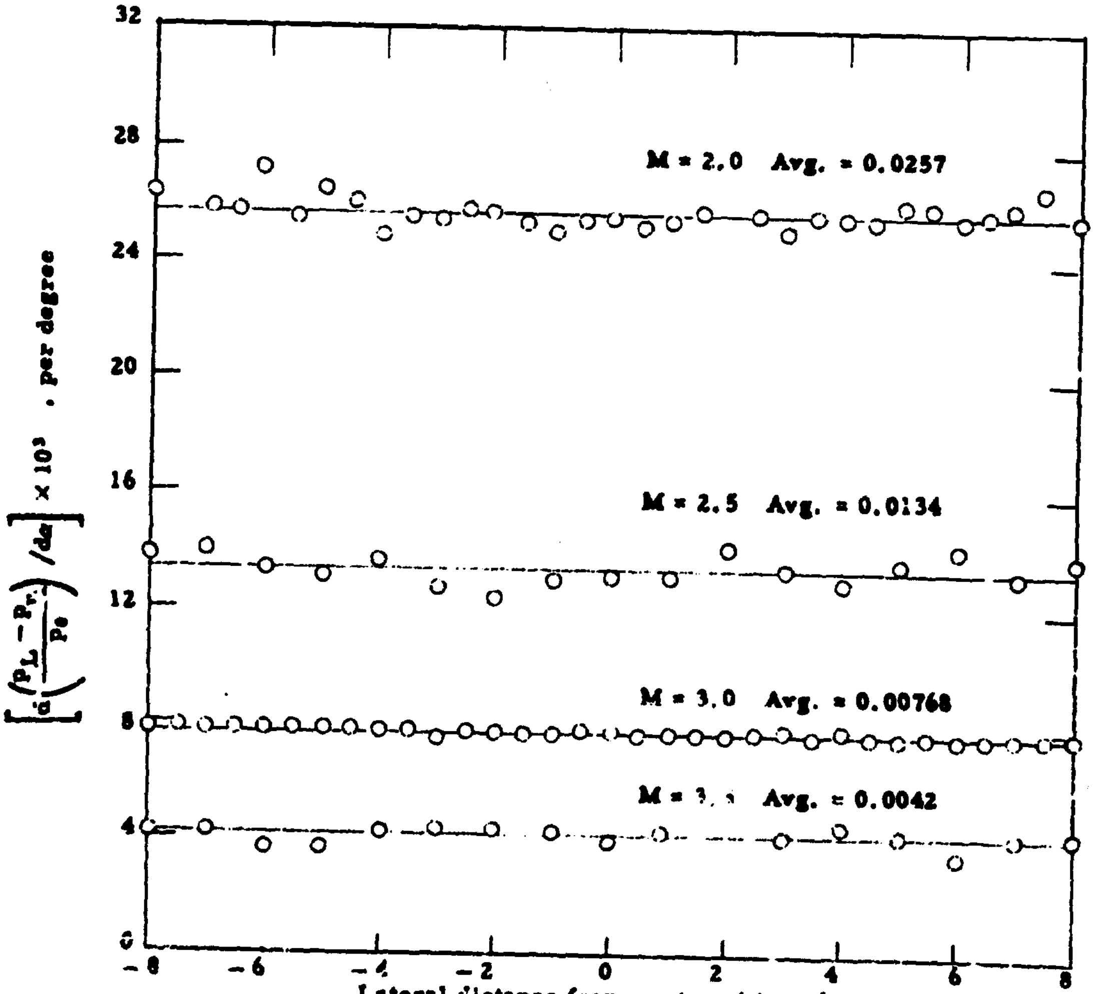
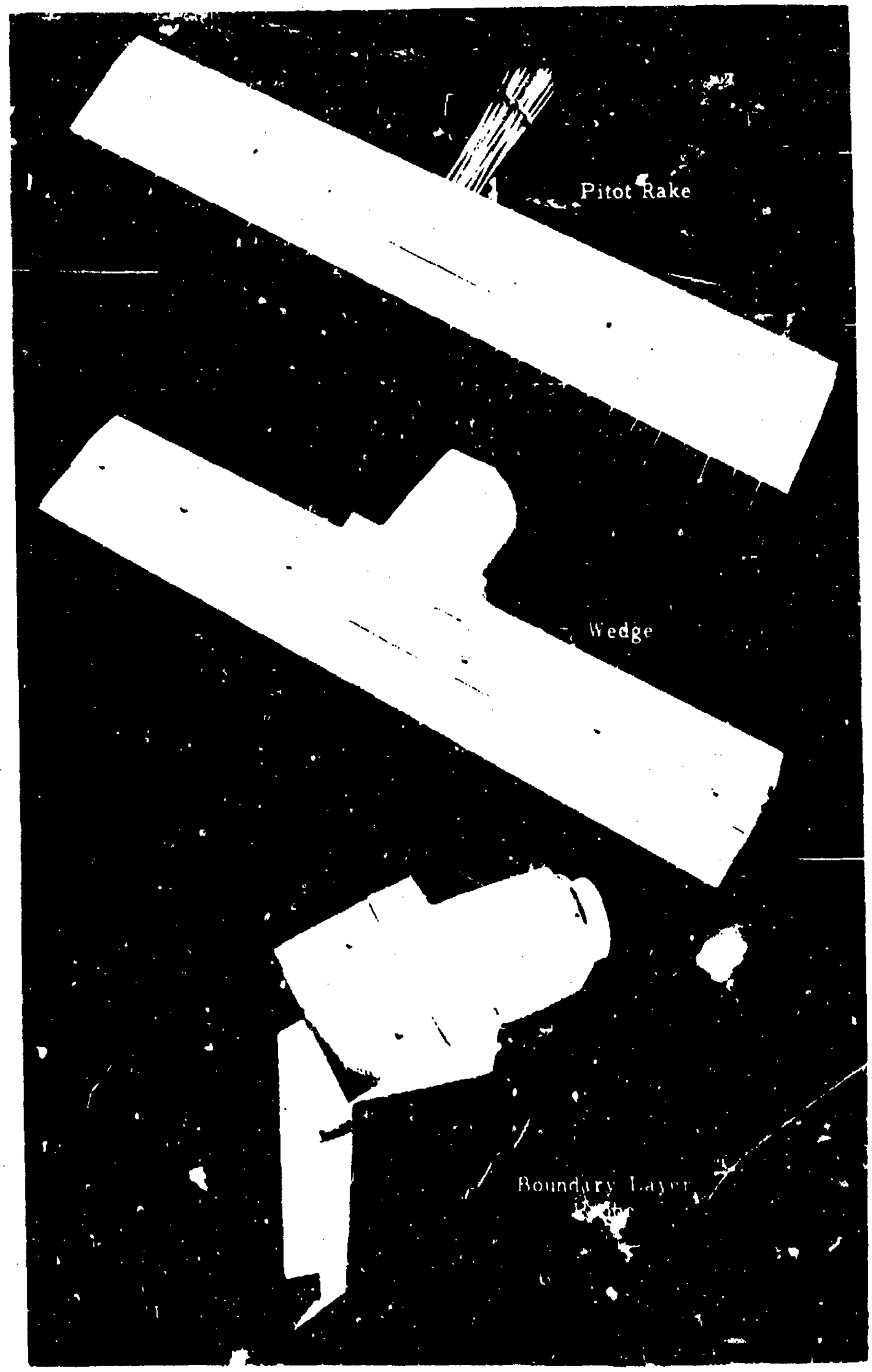


Fig. 29 Naval Supersonic Laboratory wedge calibrations for M = 2.0, 2.5, 3.0, and 3.5



Pitot Rake
Wedge
Boundary Layer

SECTION 11

CALIBRATION DATA

The variable-density, continuous-flow wind tunnel at the Naval Supersonic Laboratory operates at a nominal stagnation temperature of 110°F with stagnation pressures in the range of 0.4 to 2.4 atmospheres. Nozzles are restricted to a maximum aerodynamic length of 90 inches* and test-section heights are limited to 24 inches ($M_d < 2.5$) and 18 inches ($M_d > 2.5$) by the compressor characteristics. Rated power is 10,000 horsepower. A more detailed description of the facility may be found in Reference 47.

The physical characteristics of the Laboratory's nine nozzles** are compiled in Table 6 on the following page. The over-all length in each case was chosen to approximate one-dimensional flow as closely as possible (i.e., minimum η_d), but included a large portion of the subsonic wall streamline to insure the correct sonic line shape. For the higher design M_d's the over-all length was reduced due to weight considerations, since the sharp contraction on the subsonic side yielded similar (l/h_T) magnitudes. A calibration sequence has been listed, since in each nozzle design some improvement was attempted on the basis of the earlier experimental results and the order proves of interest in the interpretation of the data.

At the inception of the first nozzle design ($M_d = 2$), very little was known about the effects of viscosity, contour waviness, tolerances, or the acceptability of the Friedrichs method. The specifications for the Mach 2 nozzle required a $\pm$ 0.01-inch ordinate tolerance and a maximum departure of waviness of ~ 0.001 inches from a mean line. The design was based upon series to within η^4 powers and no viscous compensation was

---

*The blocks contain an additional 4-1/2 inches of length downstream of the exit plane, the latter coinciding with the vertical centerline of the observation window.

**This specifically refers to those supersonic nozzles based entirely upon the Friedrichs method. In addition, there is a subsonic nozzle (Appendix II) and a variable Mach number transonic nozzle available for test purposes.

Table 6

Summary of Physical Characteristics of NSL Nozzle

Design Mach No.	Calibration Sequence	Lengths (inches) Subsonic	Lengths (inches) Supersonic	Lengths (inches) Over-all	Test Section Height (inches)	Design Streamline η_d	ℓ/h_T
1.500	5	46.649	40.909	87.558	24	0.150	3.41
1.712	2	36.160	42.797	78.957	24	0.194	3.57
2.00	1	36.20	50.30	85.50	24	0.200	4.19
2.250*	-	35.000	52.239	87.239	24	0.200	4.35
2.500	3	31.645	54.485	86.130	24	0.200	4.54
2.750*	-	30.939	46.514	77.453	18	0.160	3.98
3.000	4	30.655	48.224	78.879	18	0.150	4.0[illegible]
3.250*	-	25.649	49.444	75.093	18	0.140	4.11
3.500	6	23.450	49.800	73.250	18	0.130	4.15

*The M_d = 2.25 nozzle is now available for test, but was not calibrated in time for the results to appear in this report. The M_d = 2.75 and 3.25 nozzles are under construction.

included. All subsequent nozzles d... ...dary-layer correction, and the last two calibrated, Mach 1.5 a... ... well as the later M = 2.25, 2.75, and 3.25), nozzles include computations to within the η^6 powers. Starting with the fourth nozzle ($M_d = 3$) closer control over template waviness was initiated when it was realized how significant this was for the final block. Ordinates are now specified to 0.001 inch with a tolerance of $\pm$ 0.005; the finished block virtually never differs by more than 0.003 inches.

11.1 Contour-Pressure Distributions

Fig. 31 illustrates the static-pressure variation along the curved contour as predicted by theory and measured with the taps shown in Fig. 23. The characteristic shape is that of a nearly linear decrease through the minimum section, followed by a sharp change in slope at the inflection point, and a rather gradual decrease to the exit plane. For the representative cases, Mach 1.7, 2.5, and 3.0 nozzles, the agreement with experiment is good, but with some noticeable deviations downstream of the inflection point. The indicated expansions and compressions correspond to measurements made on the axis within the test rhombus (Fig. 33 b, c). Of major interest is the fact that the inflection point appears to cause no profound influence on the test-region flow.

11.2 Mach-Number Calibrations

Using the aforementioned pitot rake in combination with stagnation pressure, the local Mach numbers were measured in horizontal planes at y = 0, $\pm$ 2 inches and in the vertical plane dividing the tunnel. Some examples of lateral distributions of Mach number for each nozzle are shown in Fig. 32. Each such distribution has been averaged to obtain a representative value for a given axial position with the results shown in Fig. 33 and tabulated in Table 7.

The Mach 2 nozzle (Fig. 33b) exhibits an oscillatory M distribution and is the only case in which the average M is below the design value; undoubtedly this is due to the lack of a viscous correction. The expansion to $M \doteq 2.03$ at $(x - \ell) = -3$ inches corresponds to the waviness at $x \doteq 26$ inches in Fig. 21a, as do the lesser perturbations to other waviness deviations.

A visual indication of the waviness effect is shown in Fig. 34 for the

Mach 1.7 nozzle. The schlieren photograph of Fig. 34a discloses three disturbance lines (marked by arrows) emanating from the upper block. Assuming these lines are straight, the source of the disturbances were found to lie at the contour locations indicated by arrows in Fig. 34b. The hump in the waviness curve at $x \cong 24$ inches implies a too convex surface (i.e., a compression) which is responsible for the decrease in M at $(x - \ell) \cong -6$ in Fig. 33b. Since the integral of the waviness curve is proportional to the slope of the contour, a rough check can be carried out by employing hodograph angles. In this case more than half the decrease (from M = 1.729 to 1.711) in M at $(x - \ell) \cong -6$ inches is explained by the area within the waviness hump. Of course, the method of Section 9 is applicable. Such correlation between the "boundary condition," measured perturbations, and photographic evidence are to be expected; however, especial importance is attached to the template-waviness humps, since they are indications of the flow quality prior to constructing the nozzle blocks.

It is clear that for the higher Mach-number designs of 2.5 and 3.0 the flow over-expands in the forepart of the test rhombus. The comparatively slight perturbations superimposed upon the long wavelength variation are attributed to waviness in the contour, but the main departure from uniformity is dependent upon the order of the series approximation employed in the design.

Including the higher order approximation yielded the calibration data for the $M_d = 3.5$ nozzle shown in Fig. 33c. Unfortunately, all of the contour waviness was not removed, but a comparison with the M = 2.5 and 3.0 nozzle data shows that the local overexpansion common to those blocks has been eliminated. Table 7 points out that the maximum deviations (%) from an average M value are best for the M = 1.5 and 3.5 results; the very satisfactory data in the lower M instance is undoubtedly due, in part, to the approach to one-dimensional conditions at that M level. The high average M value for the $M_d = 3.5$ nozzle (average M = 3.556) is a result of viscous considerations and will be explained below in those terms.

Table 7

Condensed Summary of Calibration Results

← Axial M Distribution Along Axis →

Design Mach Number	Average Mach Number	Test Length Considered (inches)	Lateral Length Considered (inches)	Deviation from Average (%M)	Average Standard Deviation Laterally (units of M)
1.500	1.508	22	8	+ 0.33 - 0.40	0.004
1.[illegible]2	1.717	30	16	+ 0.76 - 0.47	0.00[illegible]
2.00	1.986	33	1[illegible]	+ 1.12 - 1.31	0.005
2.500	2.506	36	1[illegible]	+ 1.12 - 0.80	0.004
3.000	[illegible].009	32	[illegible]	+ 0.80 - 0.76	0.004
3.500	3.[illegible]	29	1[illegible]	+ 0.65 - 0.67	0.[illegible]

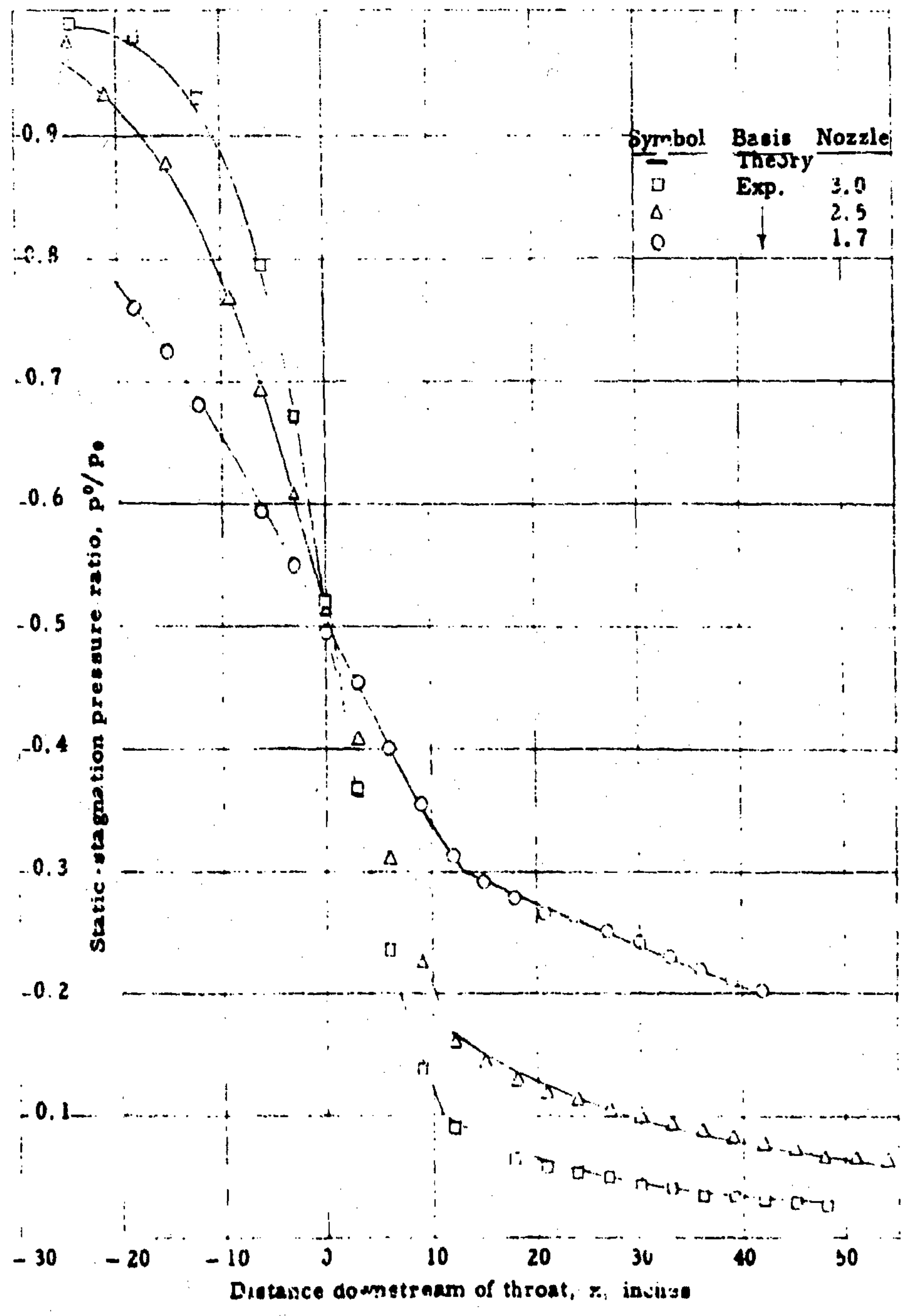


Fig. 31 Static-pressure distributions along nozzle contour

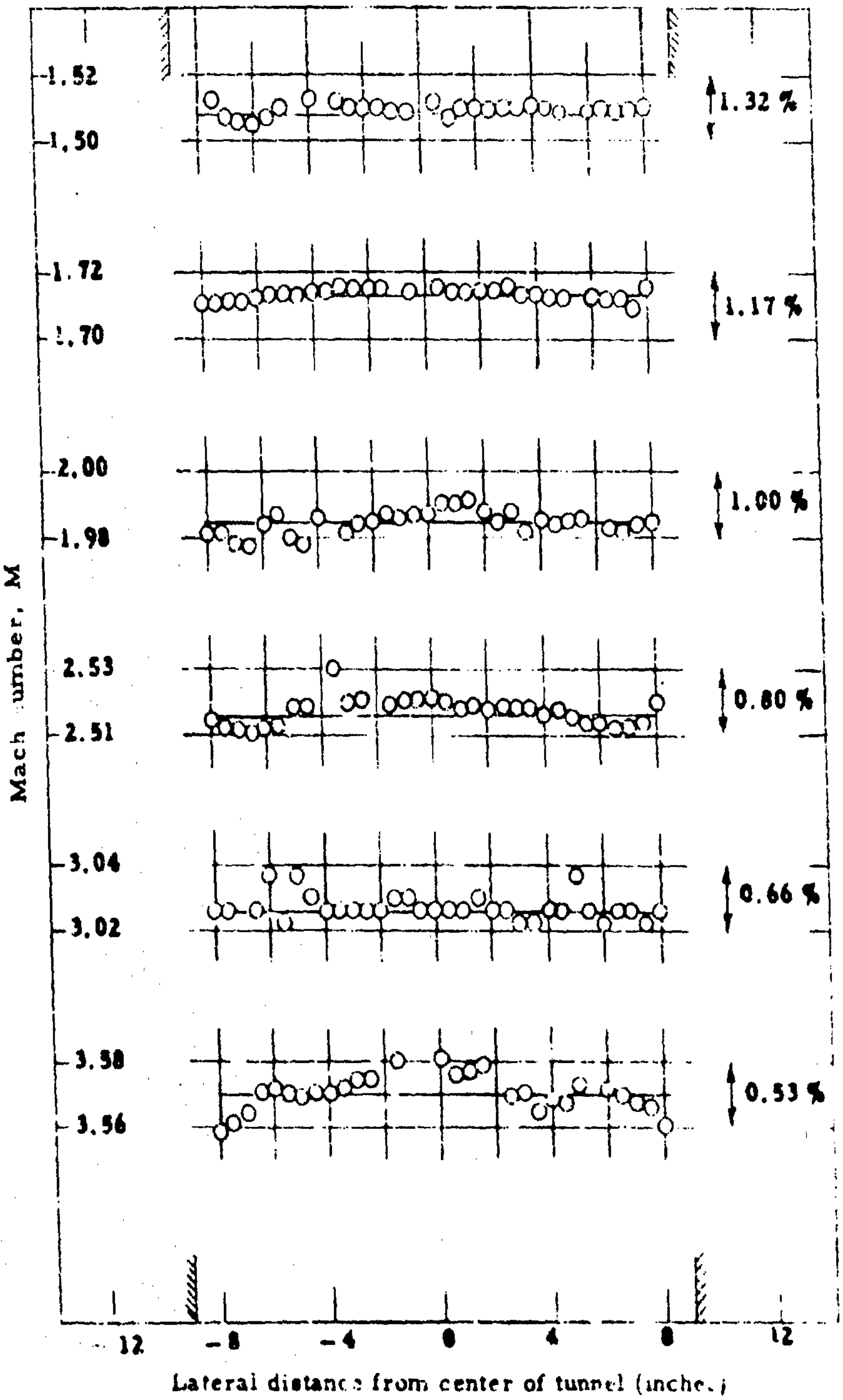


Fig. 32 Spanwise distributions of Mach number in the test section

Noz.	Symbol	Rake	$(RN/FT) \times 10^{-6}$	y	$M_{avg.}$
1.5	O	Hor.	5.15	0	1.508
	∇			−2	1.509
	Δ		3.43	0	1.515
	□	Vert.	5.15	- -	1.507

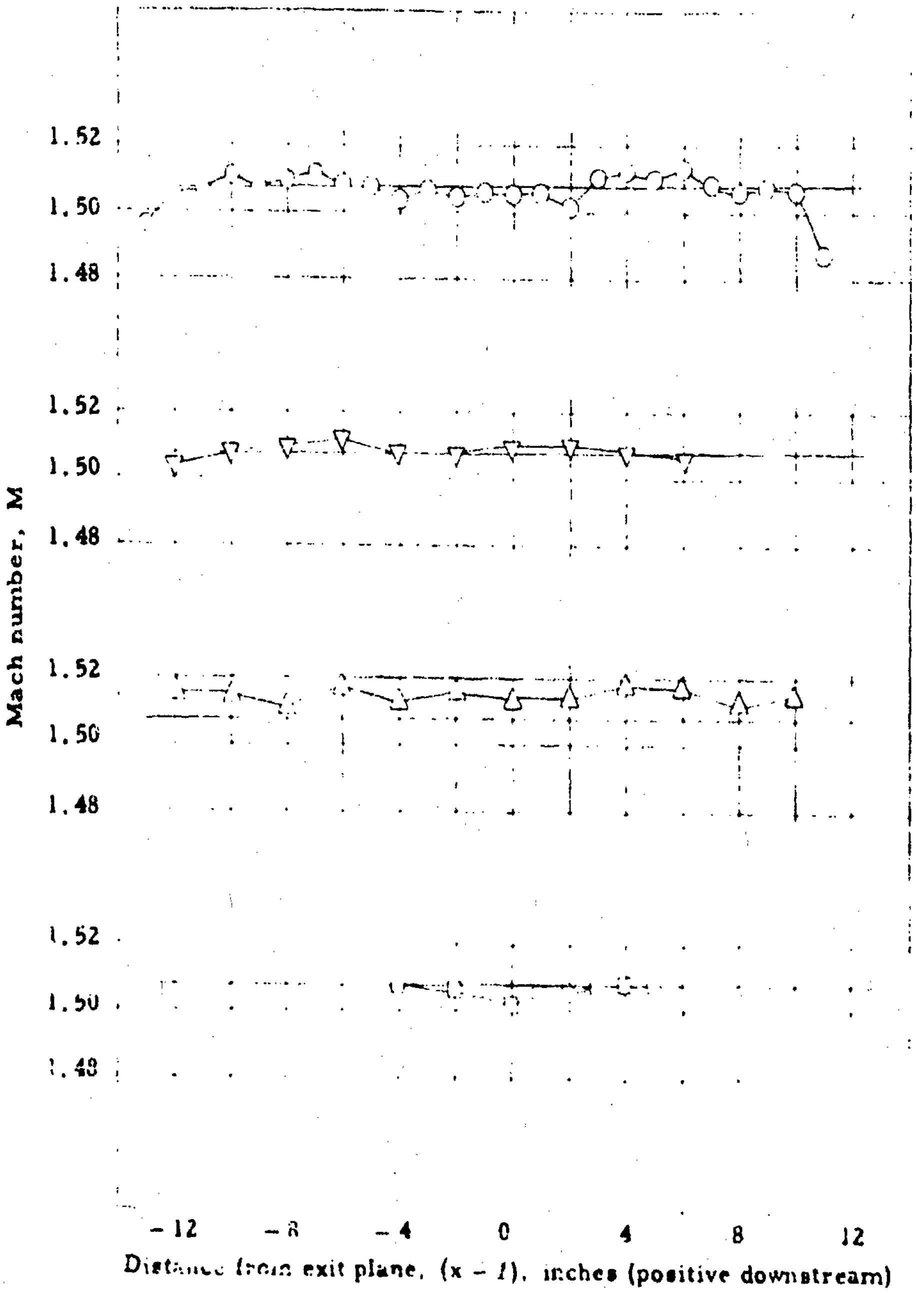


Fig. 33a Axial distributions of Mach number in the test section

Noz.	Symbol	Rake	$(RN/FT) \times 10^{-6}$	y	$M_{avg.}$
1.7	○	Hor.	5.13	0	[illegible]
2.0	○	↓	4.60	↓	1.986
↓	△	↓	3.39	↓	
2.5	○	↓	3.95	↓	2.506
↓	△	↓	2.64	↓	

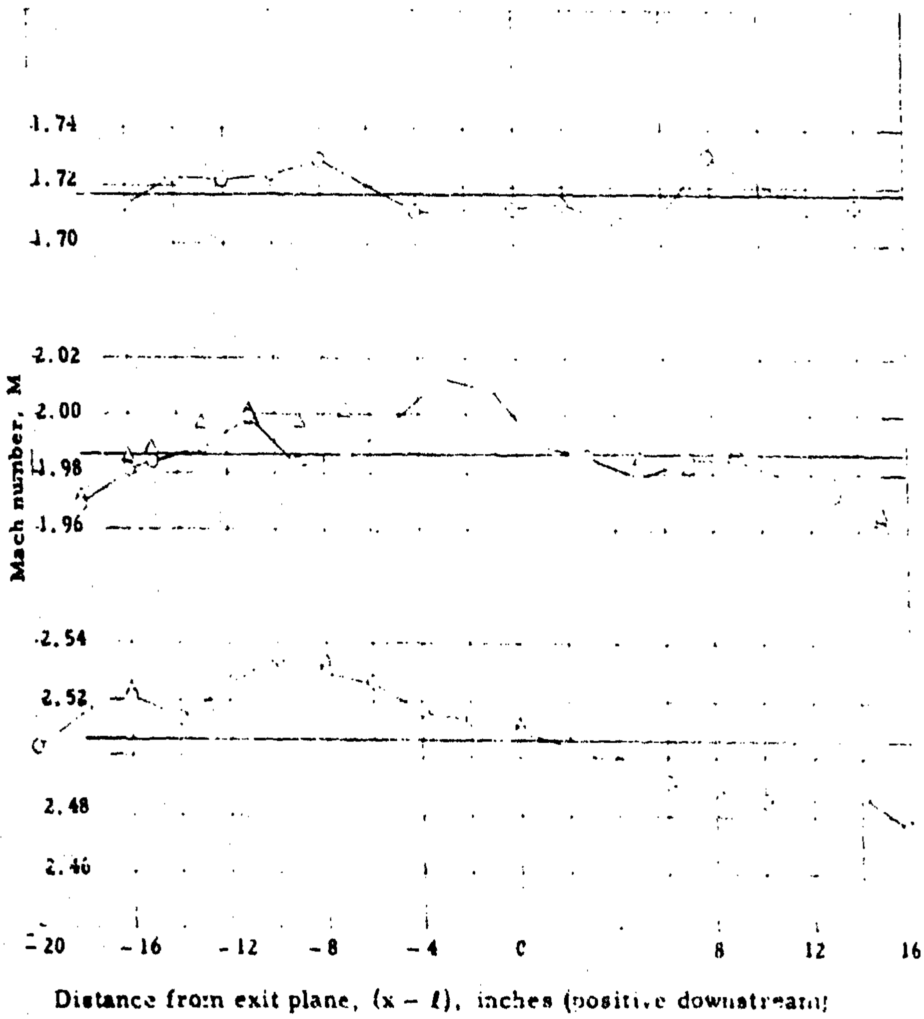


Fig. 33b

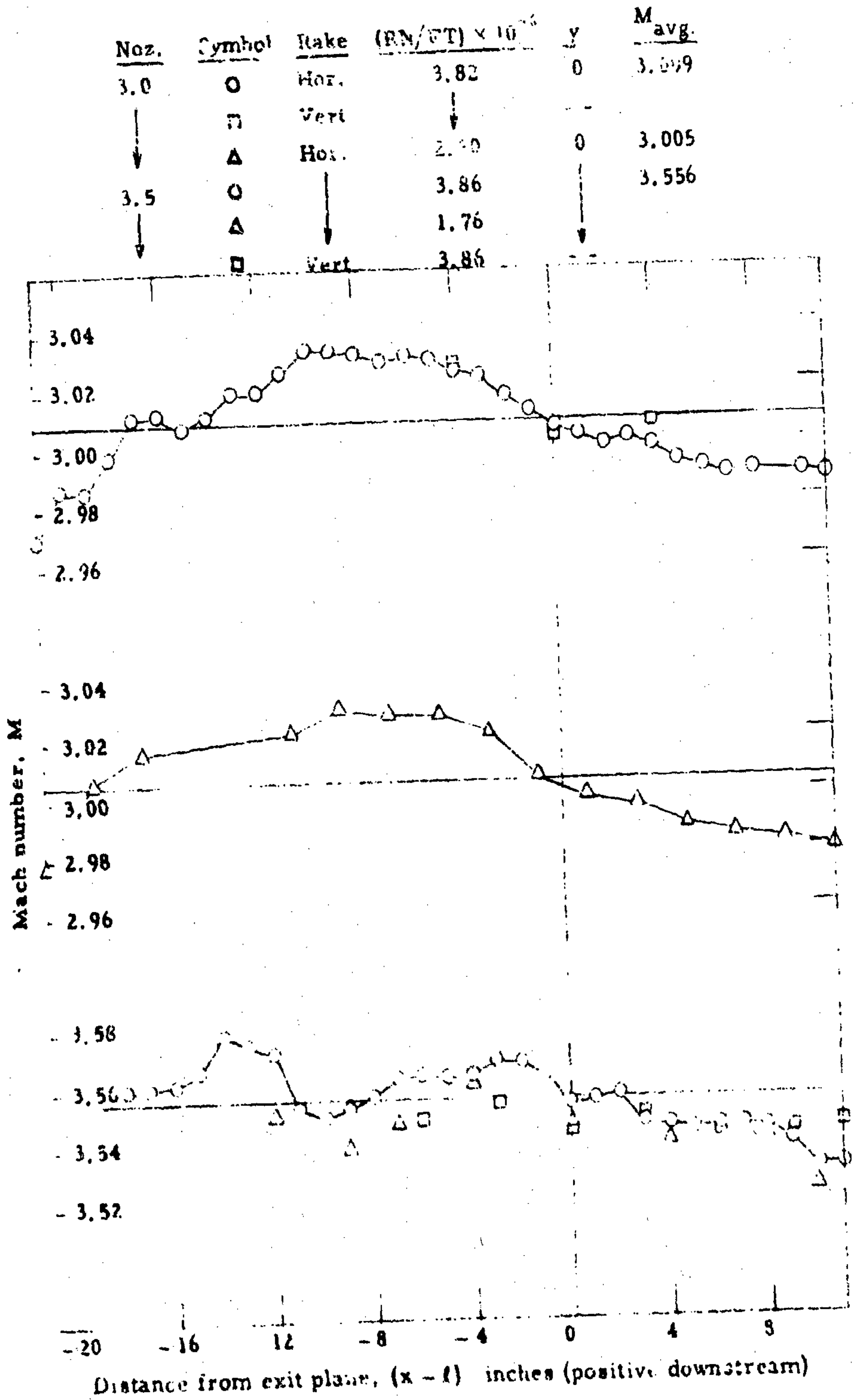

Noz.
Symbol
Rake
y
Mavg.
3.0
Hor.
3.82
0
Vert
Hor.
0
3.005
3.556
3.5
3.86
1.76
Vert
3.86
3.04
3.02
3.00
2.98
2.96
3.04
3.02
3.00
2.98
2.96
3.58
3.56
3.54
3.52
Mach number, M
-20
-16
12
-8
-4
0
4
8
Distance from exit plane, (x – ℓ) inches (positive downstream)

Fig. 33c

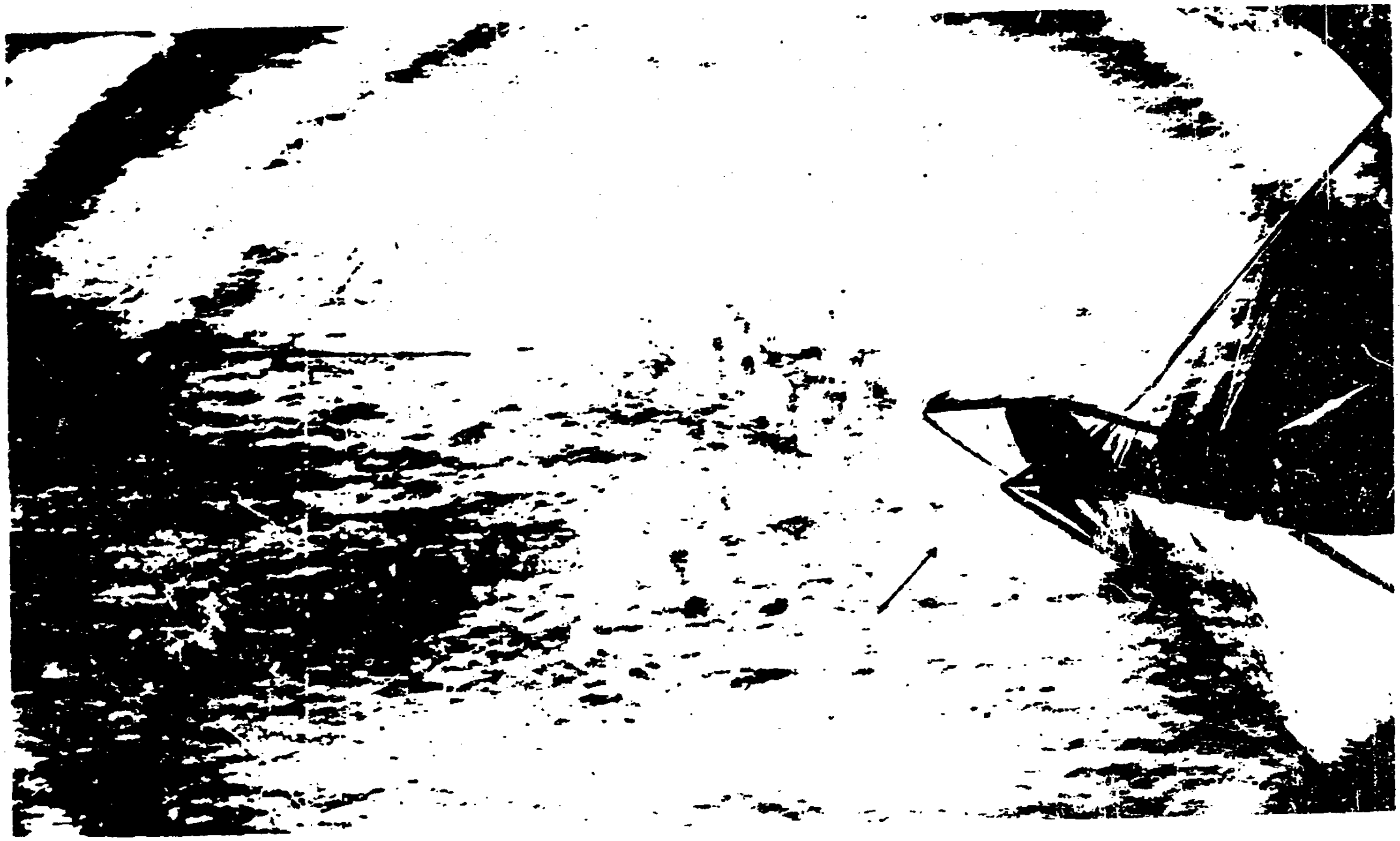


Fig. 34 Correspondence of contour waviness and schlieren photograph striae for the $M = 1.71$ nozzle. (a) Schlieren photograph

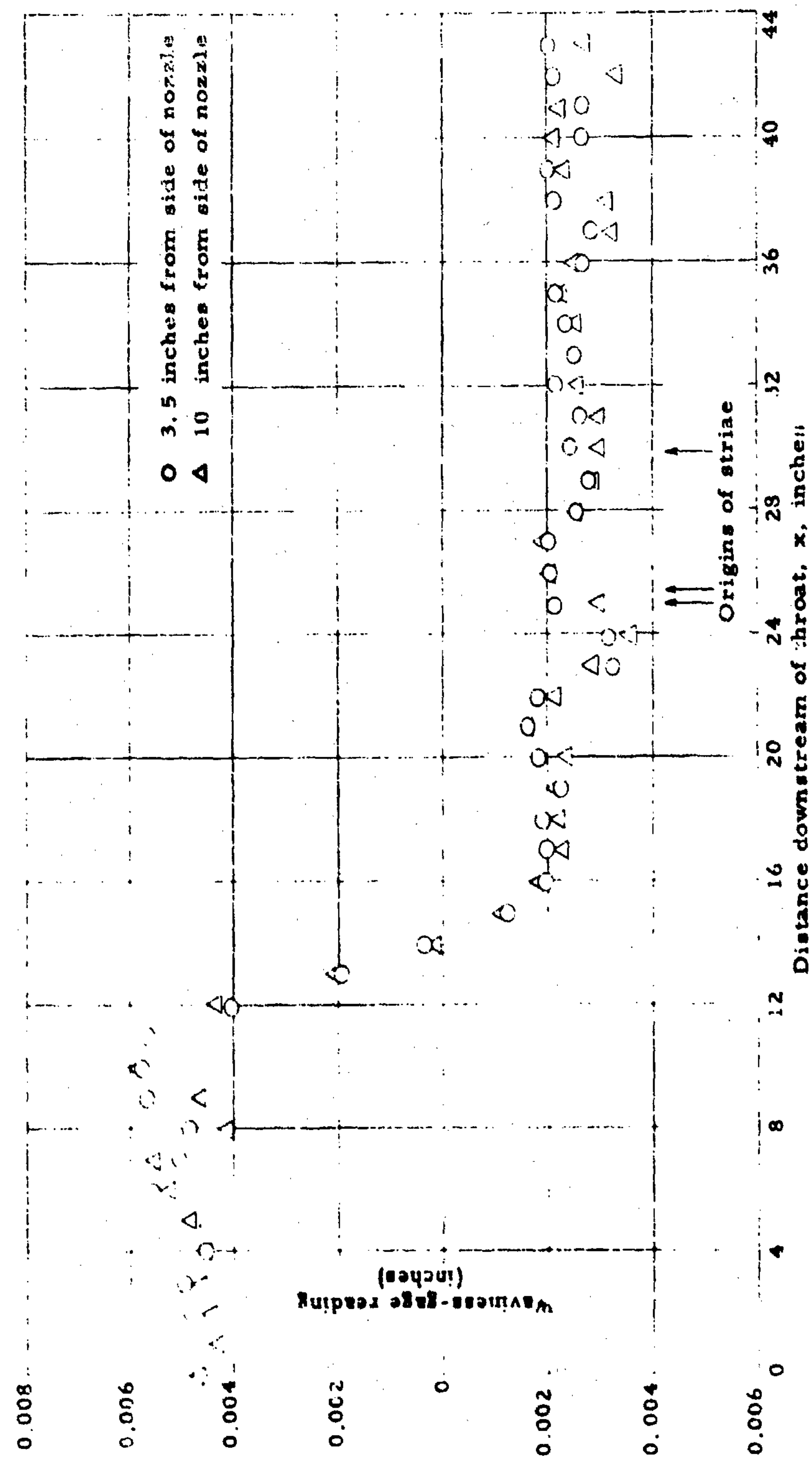


Fig. 34(b). Waviness measurements

It is natural to expect two-dimensional flow no matter how poor a design may be.* One criterion then for flow quality is that the axial and lateral variations be of the same order. Comparing the percentages shown in Fig 32 and Table 7 illustrates that at high M_d's some improvement in longitudinal variations is still possible; at the lower end of the spectrum, the $M_d = 1.5$ case has comparable deviations in both directions.

Vertical-plane averages are seen to be in good agreement with the data obtained in horizontal planes. Decreasing the Reynolds number by a factor of approximately two alters the general level by less than 1%.

Extensive surveys off the horizontal center-plane were not completed since it was shown that the center-plane data may be used to predict such results fairly accurately.

In Appendix III it is shown that the potential for symmetrical flow is given by

$$\phi = f(x - \beta y) + f(x + \beta y) \tag{11:01}$$

where

$$\beta = \sqrt{M^2 - 1} \quad .$$

Then

$$\phi_x = f'(x - \beta y) + f'(x + \beta y) \tag{11:02}$$

and

$$\phi_x(x, 0) = 2f'(x) \quad .$$

From the calibration data obtained on the axis, $f'(x)$ is known as a perturbation from the average value. Therefore, the off centerline variation may be found from Eq. (11:02). In practice, one need only plot two replicas of the centerplane-calibration curve, each being displaced un-

* Actually, the boundary-layer growth on the sidewalls creates a truly three-dimensional situation; the evidence on hand shows that this effect is still masked by other influences.

and downstream a distance βy, and average the new curves at ea[illegible] station.

11.3 Flow Inclination

Regardless of design errors, waviness, or viscous effects, the [illegible]zontal and vertical midplanes are symmetry planes for the flow. [illegible] only exception to this would be caused by differential waviness on the tw[illegible] [illegible]ck-halves. Figs. 35 and 36 illustrate the axial variation of flow inclina[illegible] in the same fashion as the previous M figures. The average inclinatio[illegible] the order of 0.1 degree) in each case was assumed to be zero, since [illegible] wedge-setting accuracy in pitch was ± 0.1 degree for a given set of data along a plane. Positive signs refer to the usual positive angle of attack and side slip conventions as would be experienced by a model.

Flow inclinations within a band of ± 0.1 degree along the symmetry planes were found to be present. The inclinations on planes offset 2 inches from the horizontal midplane for the Mach 3 nozzle (Fig. 35c) are in qualitative agreement with the M distribution of Fig. 33c. The same is true of the M = 2.5 data. Stream lines diverge and converge in accord with the local expansions and contractions, and are parallel at relative maximums and minimums. Control over the M distribution will thus insure satisfactory directional results.

Examples of the lateral variation of flow inclination appear in Fig. 36. As might be expected, the results are similar to the axial variations. The shaded data-points apply for the first calibration conducted with M = 2 blocks, at which time no screens were present in the upstream stilling section. After installing two 2q screens, the open circle data were obtained. The screens are credited with disrupting the effects of two right-angle bends in the tunnel circuit just ahead of the stilling section. All subsequent data were taken with the screens in place.

11:4 Boundary-Layer Data

A few typical boundary-layer profiles are compared with a 1/7 power-law variation in Fig. 37. The displacement thickness growth on the parallel and curved boundaries is shown in Fig. 38. The sidewall centerline

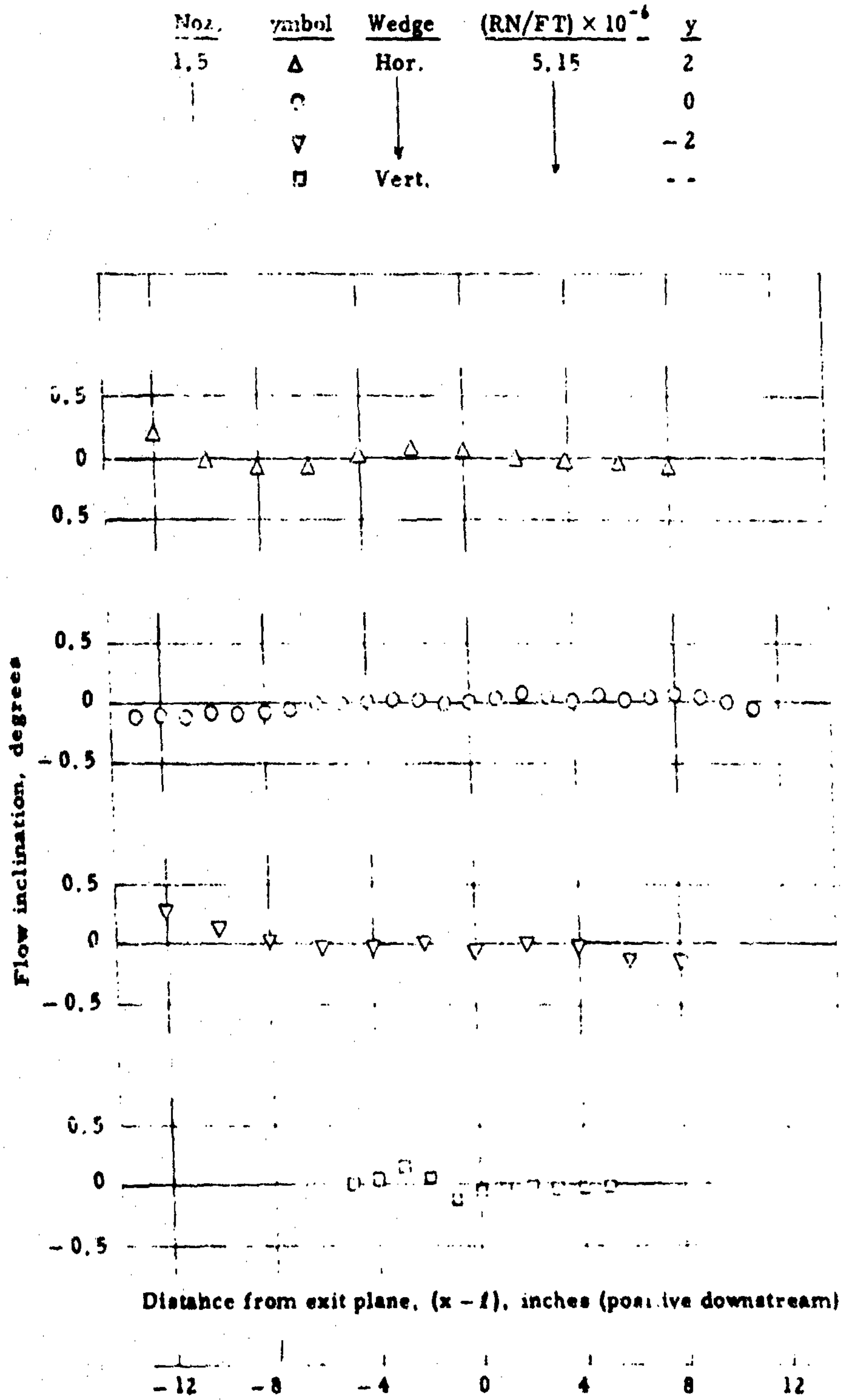


Fig. 35 Axial distributions of flow inclination in the test section
(a) M = 1.5 nozzle

Noz.	Symbol	Wedge	$(RN/FT)^{-6}$	y
1.7	O	Hor.	5.13	0
↓	□	Vert.	↓	- -
2.0	Δ	Hor.	4.60	0
↓	∇	Vert.	↓	- -

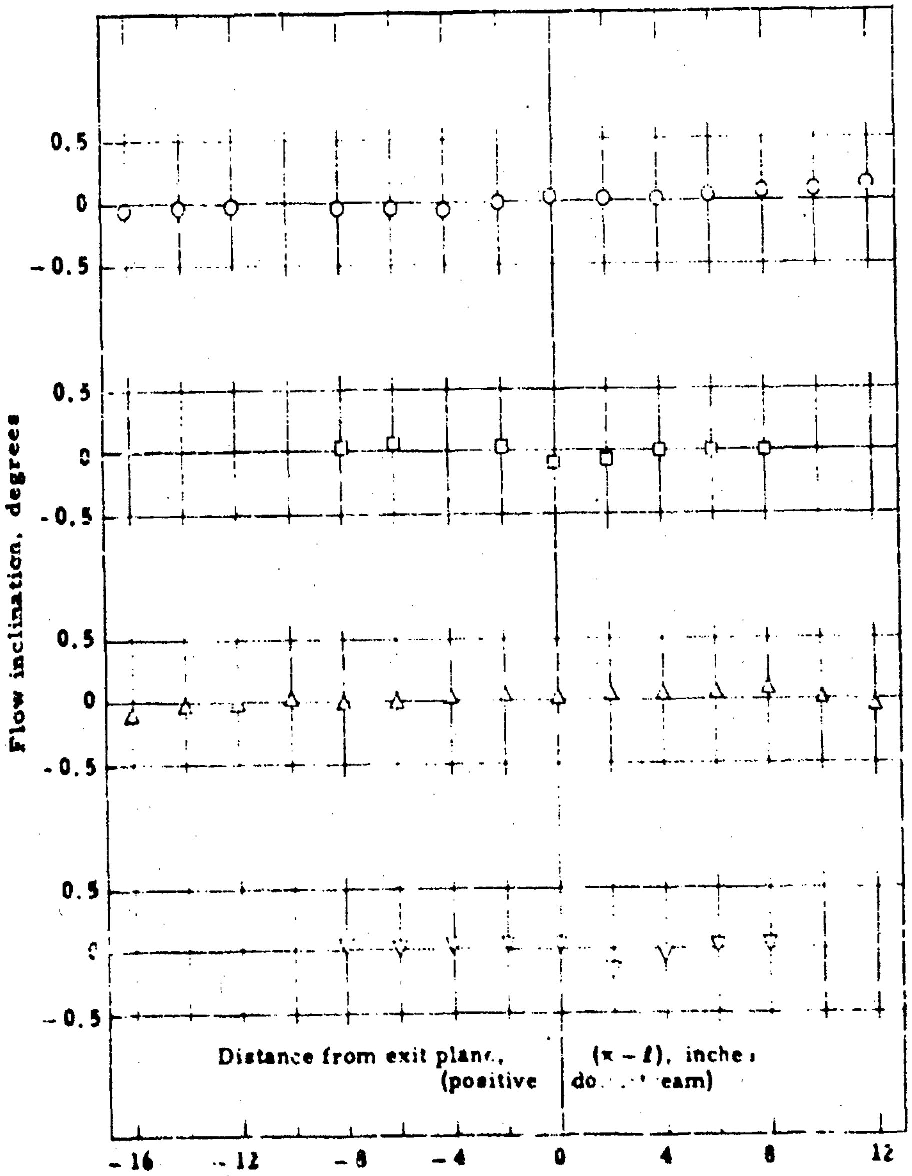


Fig. 35 (Continued)
(b) M = 1.7 and 2.0 nozzle

Noz.	Sym.	Wedge	$(RN/FT)^{-6}$	y	Noz.	Sym.	Wedge	$(RN/FT)^{-6}$	y
2.5	○	Hor.	3.96	0	3.0	□	Hor.	3.82	0
	◇		1.89			◺			2
	△		3.96	2		◸			−2
	▽			−2					
	⬭	Vert.		- -					

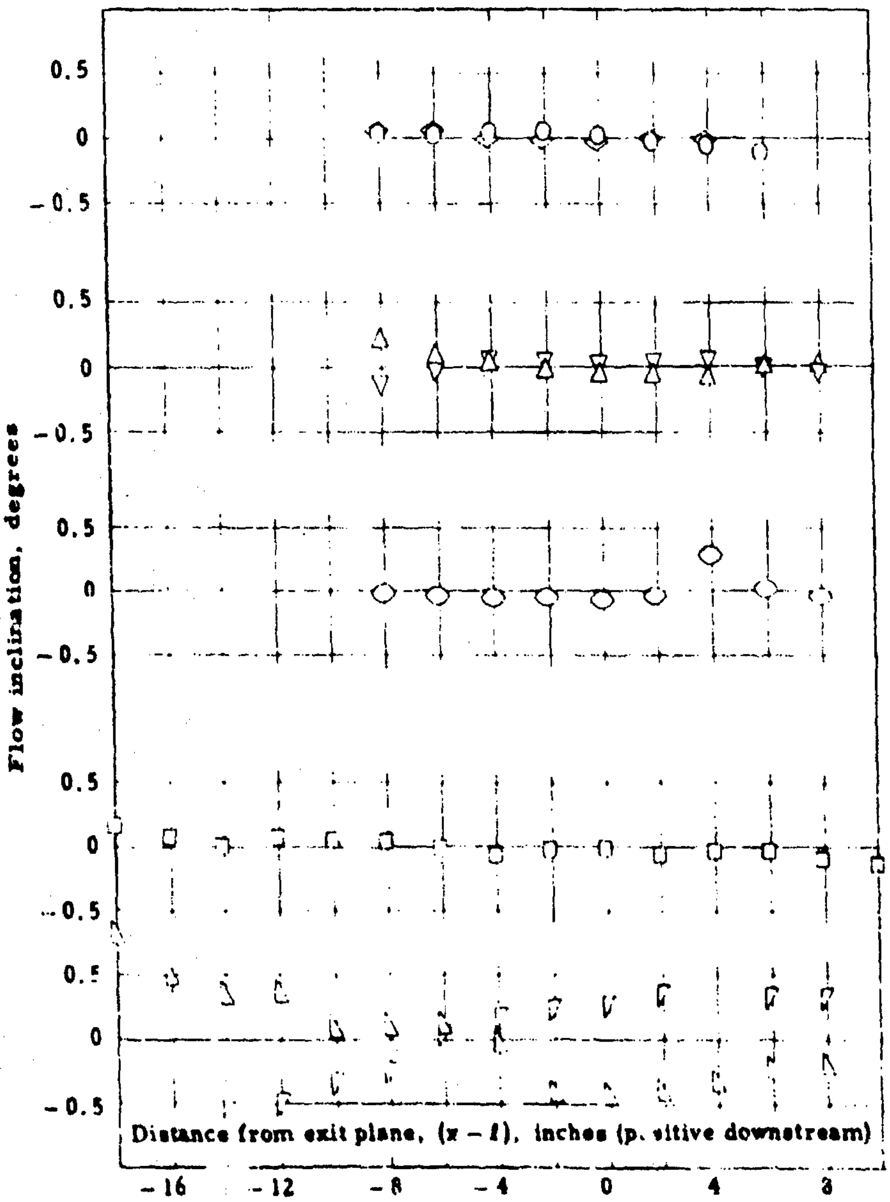


Fig. 35 (Continued)
(c) M = 2.5 and 3.0 nozzles

Noz.	Symbol	Wedge	$(RN/FT)^{-6}$	y
3.5	○	Hor.	3.97	0
↓	△	↓	1.76	0
	□	Vert.	3.97	- -
	▽	↓	1.76	- -

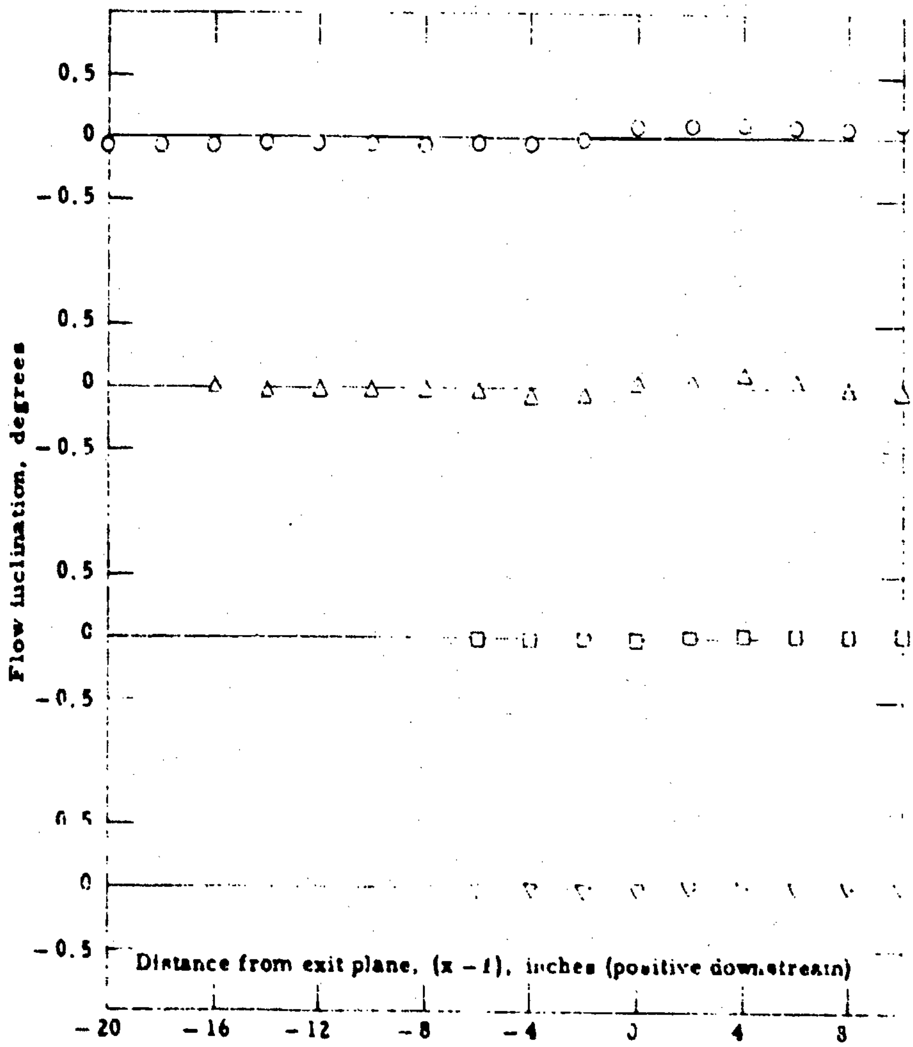


Fig. 35 (Concluded)

(d) M = 3.5 nozzle

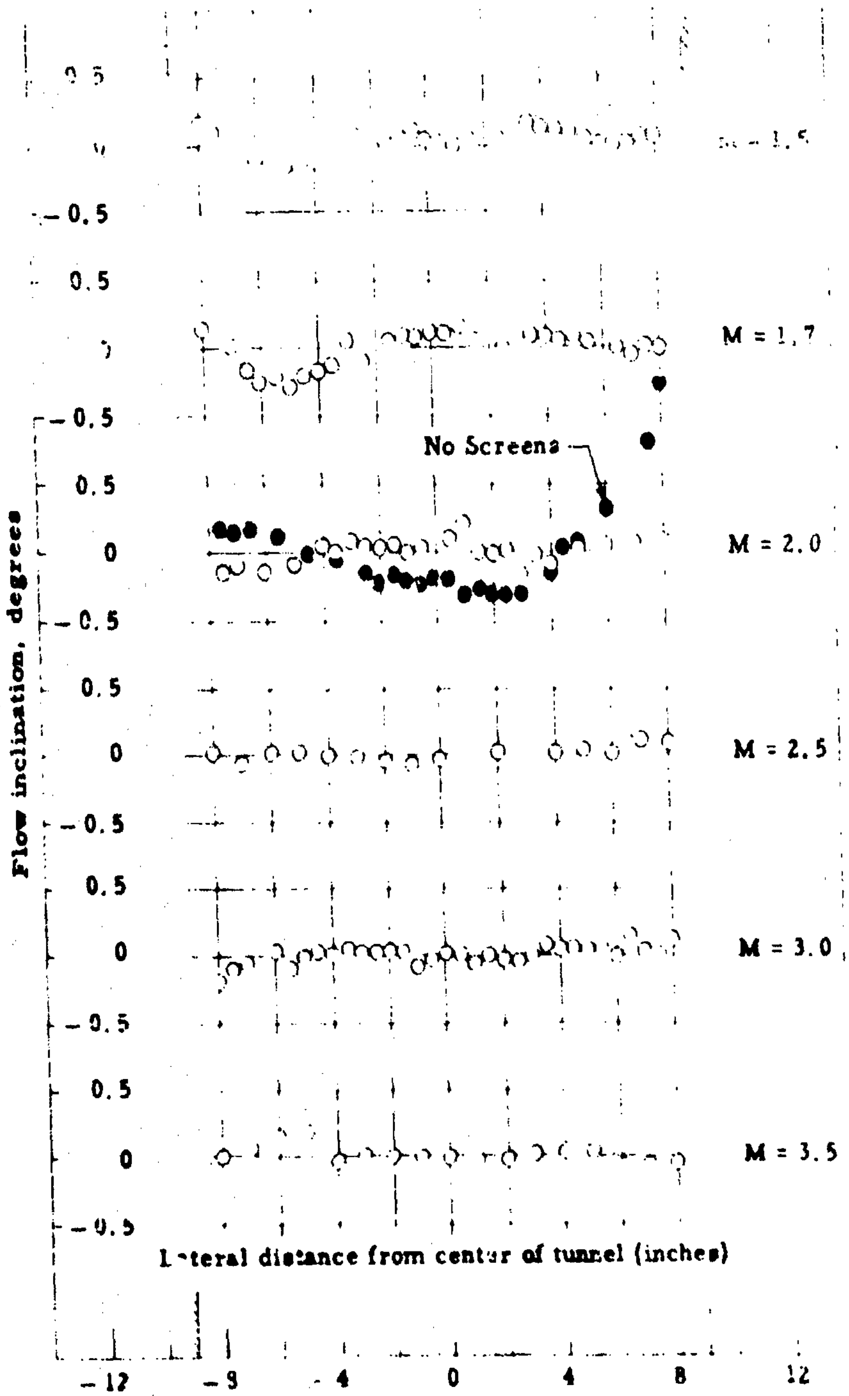


Fig. 36 Spanwise distributions of flow inclinations in the test section

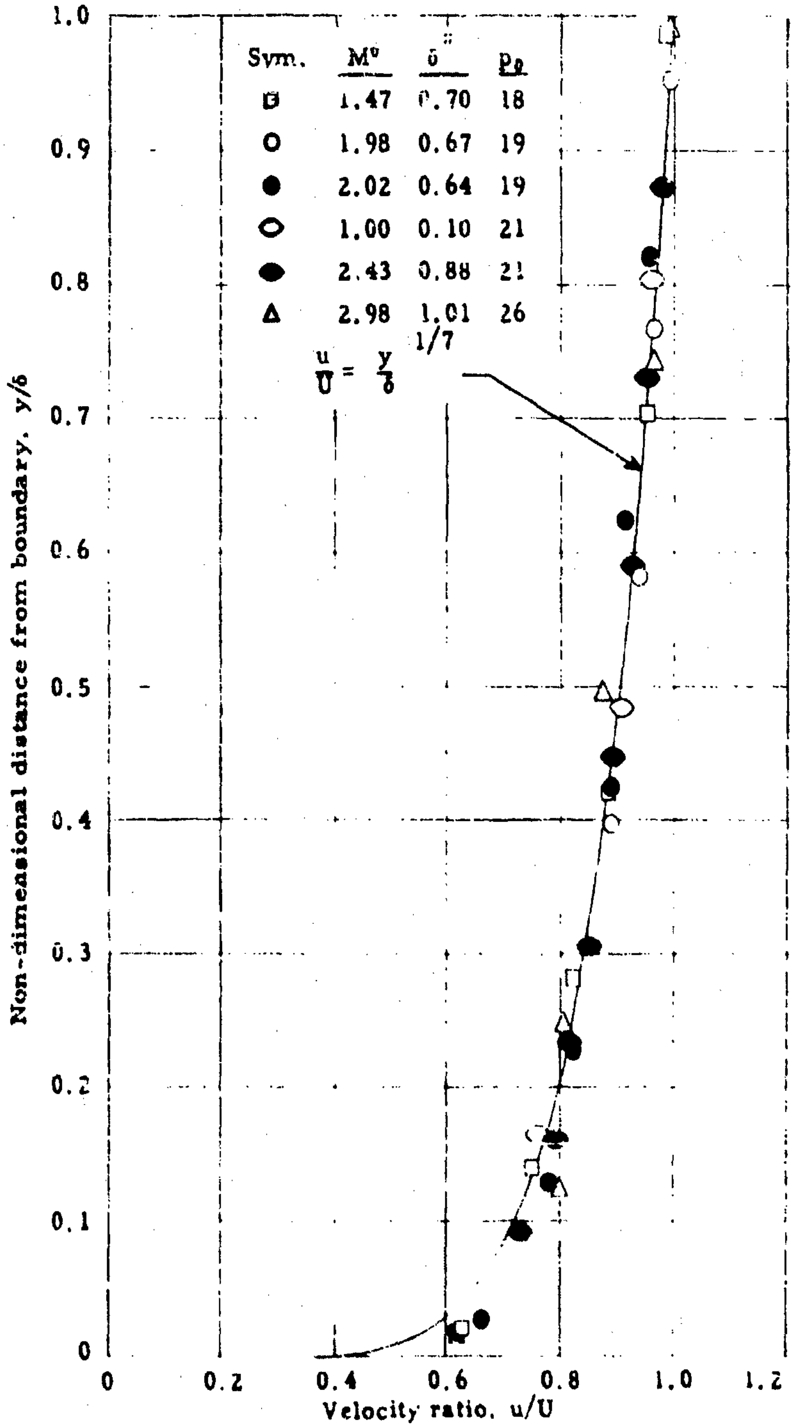


Fig. 37 Typical boundary-layer profiles

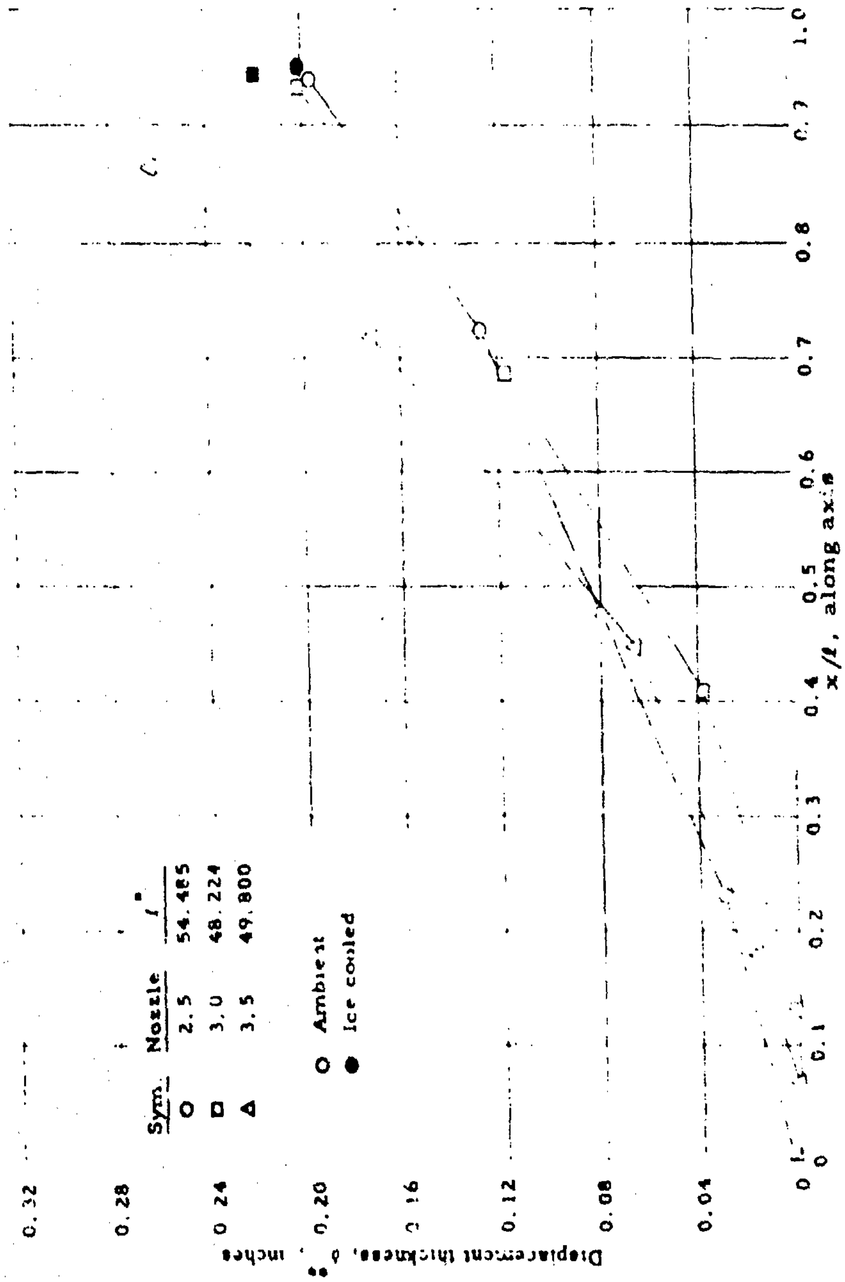


Fig. 18 Displacement-thickness measurements
(a) Sidewall

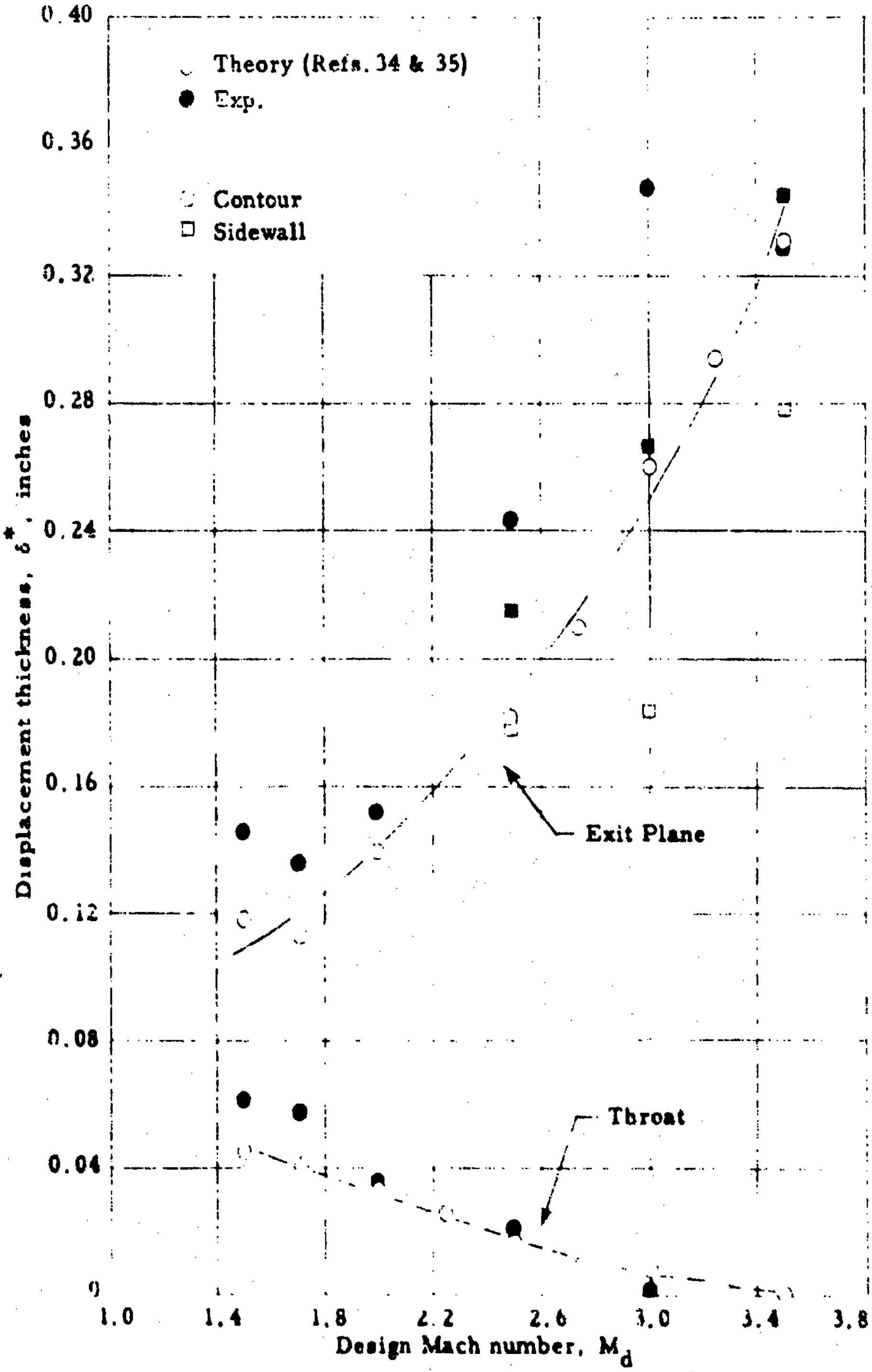


Fig. 38 (Concluded)

(b) Contour

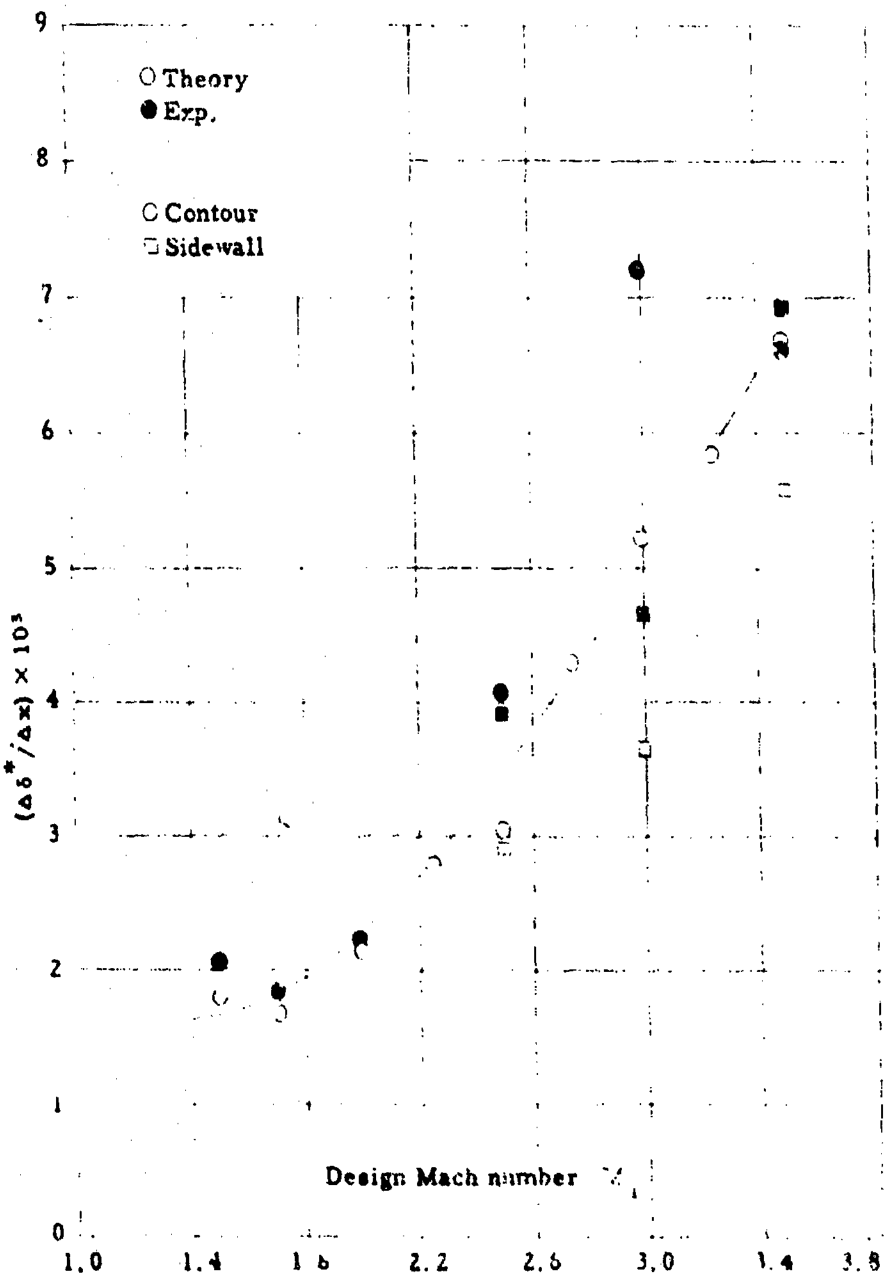


Fig. 39 Over-all rate of growth of displacement thickness (experimental) from throat to exit plane

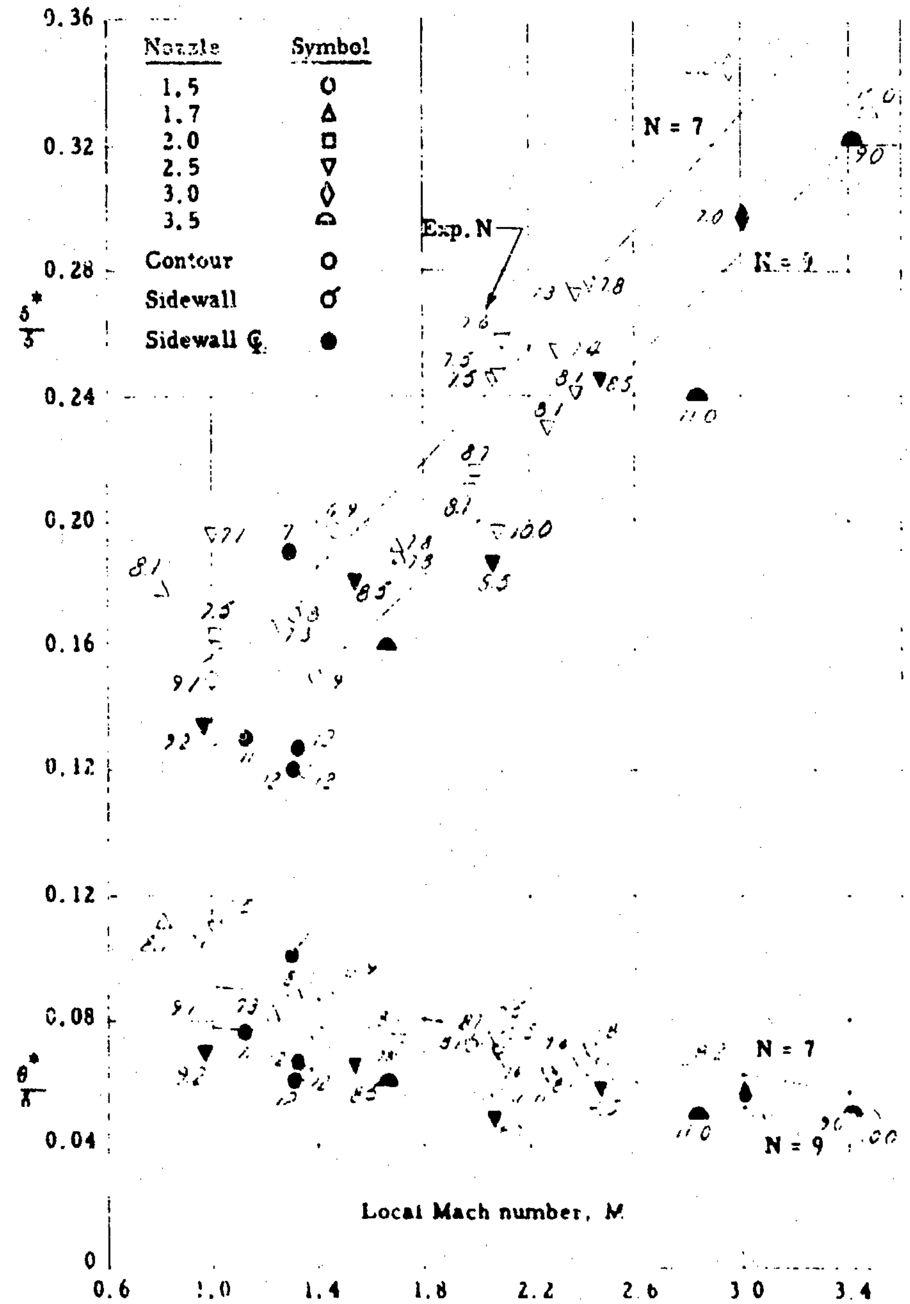


Fig. 4 a Comparison of experimental data and theory for boundary-layer parameters, δ^*/δ and θ/δ

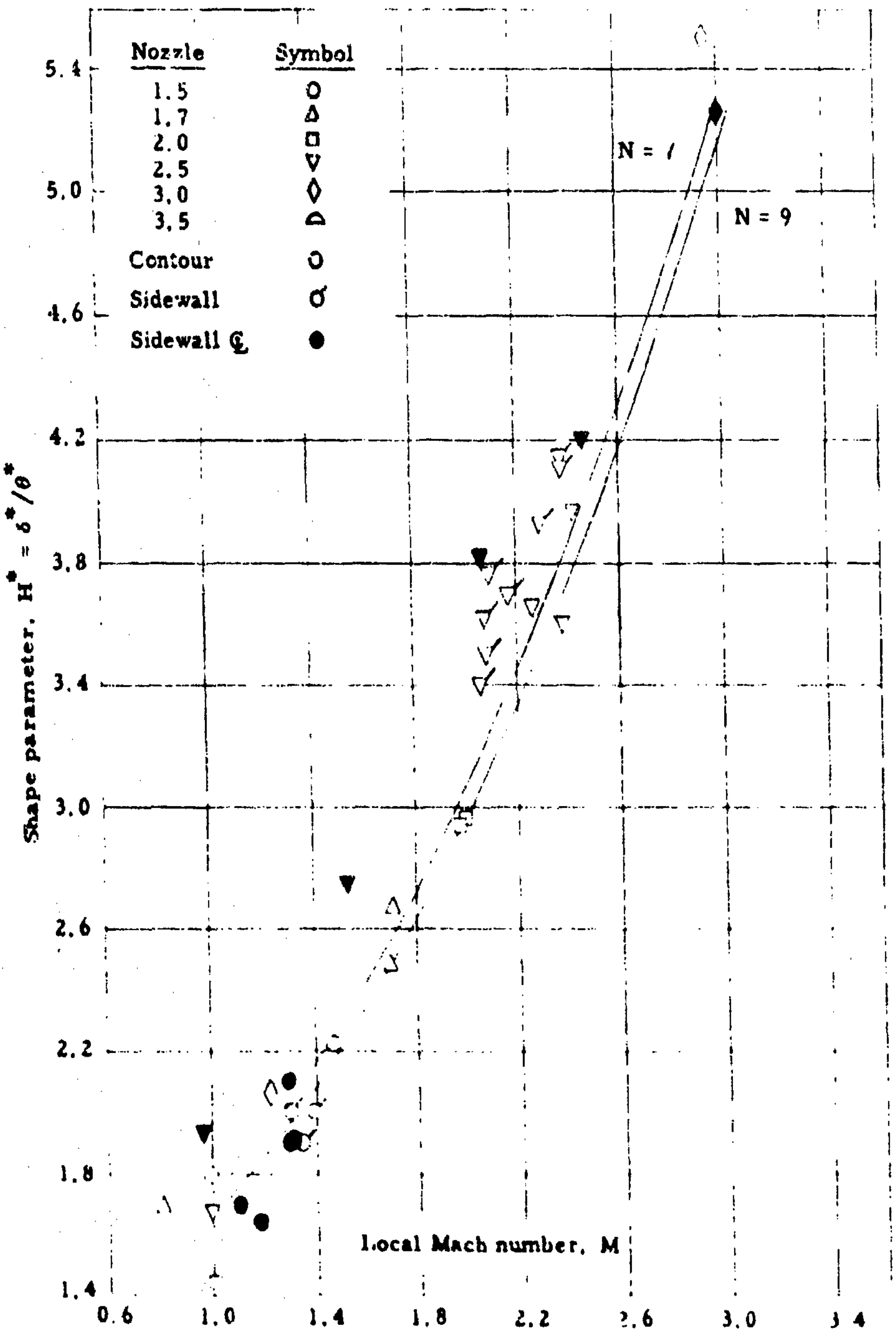


Fig. 40b Comparison of experimental data and theory for boundary-layer parameters, shape factor H^*

growth of δ^* is parabolic in nature and therefore does not conform in detail to the predictions shown in Fig. 19. However, the over-all rates of growth, $\Delta \delta^*/\Delta x$, are in fair agreement. In Fig. 38b the initial and final δ^* values, assumed and computed respectively, are depicted by open circles for each nozzle. The dashed line indicates the trend, but no exact continuity is implied, since the nozzles vary with respect to physical length, Reynolds number basis (i.e., p_0), and η_d. Shaded points indicate measured data and the agreement is reasonably good. Over-all rates of growth from Fig. 38b are plotted in Fig. 39 and again compared with predicted values.

As a further check on the assumptions of the Tucker analysis,[34, 35] ratios of measured δ^*/δ, and θ^*/δ, and δ^*/θ^* ($= H^*$, the shape parameter) are compared with theory in Fig. 40a, b. Adjacent to each point there appears N estimated from the best straight line through the velocity profile on a log-log plot. Considering the possible error in determining δ, the results indicate a satisfactory assumption of a power-law profile. Since δ is not required by the shape parameter, its comparison is perhaps more relevant. Along the contour, the agreement is good with $N \cong 7$ for $1 < M < 3$, although the sidewall data appears to increase at a faster rate corresponding to lesser inverse exponents N.

Although neither the exact distribution of δ^* along the boundaries nor a precise over-all rate of growth was predicted for all nozzles, the general calibration results yield average Mach numbers in the test rhombus which are remarkably close to the design values. The exception is the Mach 3.5 nozzle which was overexpanded by approximately 0.05 units of M. This arose due to a misinterpretation of the viscous data available during the $M_d = 3.5$ design phase. From Fig. 38b, the trend of the experimental points from $M_d = 1.5$ to $M_d = 3$ appears to indicate that the Tucker analysis underestimates the growth of δ^* for higher pressure gradients. As a countermeasure, the boundary-layer computations for the Mach 3.5 case were carried out using the Tucker analysis[35] to determine the local rates of growth and were then altered linearly to conform with the experimental trend. The δ^* measurements in the Mach 3.5 nozzle show, however, that the theory is applicable at the higher Mach numbers and that

the correction introduced a needless overexpansion.

11:5 Combination Nozzles

When the design Mach number approaches unity, the nozzle geometry approaches a one-dimensional configuration for a given l/h_T. It is known that for one-dimensional flow the slope requirement gives way to an ordinate requirement. This suggests the possible use of distinct nozzle-block halves to establish supersonic flow at other than the fixed design value and thus to increase the tunnel utility. Of course, it is not known beforehand that suitable uniform flow conditions will result from such a combination, but the ease with which some measurements may be made obviates an analysis by the method of characteristics.

A Mach 1.5 nozzle block and a subsonic nozzle block* were combined as a set, with the results shown in Fig. 41. The theoretical prediction was here based upon inviscid, one-dimensional flow, and the data represents an average of 5 pitot tube readings spanning the center 4 inches of the tunnel width (see M = 1.35 schlieren photograph in Fig. 42). Vertical gradients in Mach number amounting to ~ 0.01 per inch are present with this configuration. With a combination of a Mach 1.71 block and a subsonic contour, a single measurement was made at the center of the exit plane. The Mach number was 1.44 as compared to the prediction of 1.48.

Such combination nozzles prove of value for tests which require only a sample of the total air flow through the tunnel as in the case of diffuser-inlet programs.

11:6 Concluding Remarks

Consideration of the calibration results and the design procedures has indicated the following main points:

1. The Friedrichs method has proven satisfactory for supersonic nozzle designs in the range $1.5 < M < 3.5$. Specifically, a nozzle gen-

*Based upon the contraction analysis of Appendix II with an inclined plane extended downstream.

erating function of the form $\bar{h} = 1 + \xi^2$ and $3.4 < \ell/h_T < 4.2$ was employed.

2. For Mach numbers higher than approximately 2, it is necessary to consider series expansions to within η^6 order.

3. Waviness of the nozzle contour, as opposed to design procedures, is the main factor which induces the relatively small wavelength Mach-number perturbations in the test region. Sufficient care shown in template fabrication is decisive in eliminating such effects.

4. The presence of a curvature discontinuity in the streamlines induces no serious consequences upon the flow quality.

5. Boundary-layer corrections in accord with Tucker's analysis for the growth of the viscous layer and on a correct mass-flow basis serve to insure a proper Mach-number level in the test region. Although the experimental growth is not in agreement with theory all along the sidewall centerline, over-all rates of growth for the displacement thickness are satisfactory.

Symbol	Basis	$(RN/FT) \times 10^{-6}$	y	$M_{avg.}$
O	Hor. Rake	4.41	0	1.337
- - -	Theory	∞		

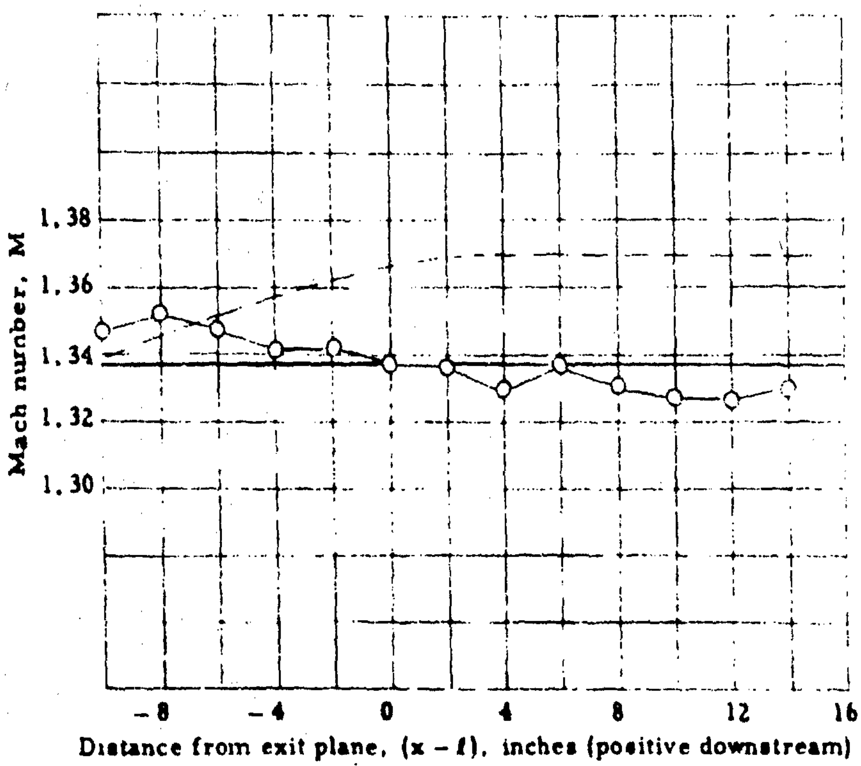
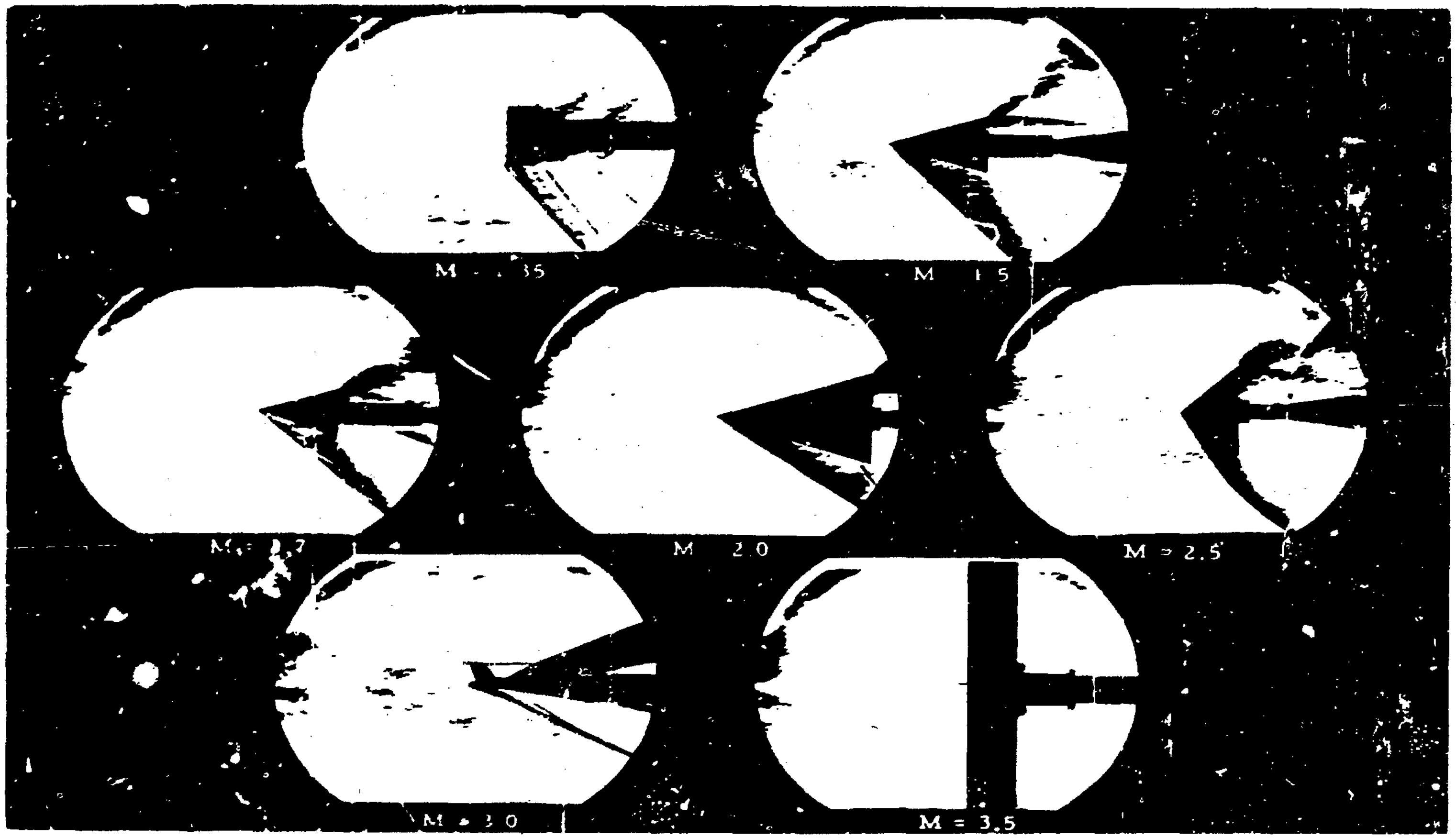


Fig. 41 Mach-number calibration for combination nozzle
(M = 1.5 and subsonic blocks)



[illegible] photographs of nozzle flow in the test section

SECTION 12

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APPENDIX I

DERIVATION OF COEFFICIENTS IN FRIEDRICHS METHOD

The following analysis is applicable to an inviscid, thermally non-conducting, homogeneous gas which obeys the perfect gas equation of state: $p = \rho RT$. The flow through the nozzle is assumed to be steady, isentropic, and irrotational.

Let the dimensionality of the flow be denoted by ζ so that $\zeta = 2$ for two-dimensional flow and $\zeta = 3$ for axially symmetric flow. As usual, ϕ and ψ designate the potential and stream functions, respectively; but the working variables for the equipotential and streamlines are (ξ, η) defined by

$$\phi = \int_0^{\xi} \bar{q}(x)\, dx \tag{I.01}$$

$$\psi = (\rho^* q^*)^{1/(\zeta-1)} \eta$$

The governing equations arising from the conditions of continuity and irrotationality for the stream function are

$$\psi^{\zeta-2} \frac{\partial \psi}{\partial y} = \rho q (\cos\theta)\, y^{\zeta-2} \tag{I.02}$$

$$\psi^{\zeta-2} \frac{\partial \psi}{\partial x} = -\rho q (\sin\theta)\, y^{\zeta-2}$$

and for the potential function,

$$\frac{\partial \phi}{\partial y} = q \sin\theta \tag{I.03}$$

$$\frac{\partial \phi}{\partial x} = q \cos\theta$$

Reversing the dependent and independent variables, the following is obtained

$$\frac{\partial y}{\partial \psi} = \frac{\psi^{\zeta-2}}{\rho q} (\cos \theta)$$

$$\frac{\partial x}{\partial \psi} = -\frac{\psi^{\zeta-2}}{\rho q} (\sin \theta) \tag{I:04}$$

and

$$\frac{\partial y}{\partial \phi} = \frac{\sin \theta}{q}$$

$$\frac{\partial x}{\partial \phi} = \frac{\cos \theta}{q} \tag{I:05}$$

Now introduce the area-ratio function

$$h = \left(\frac{\rho^* q^*}{\rho q} \right)^{1/(\zeta-1)} \tag{I:06}$$

and the (ξ, η) coordinate system from Eq. (I:01).

Then

$$\frac{\partial y}{\partial \eta} = h \left(h \frac{\eta}{y} \right)^{\zeta-2} \cos \theta = \frac{\partial y}{\partial \psi} \frac{d\psi}{d\eta}$$

$$\frac{\partial x}{\partial \eta} = -h \left(h \frac{\eta}{y} \right)^{\zeta-2} \sin \theta = \frac{\partial x}{\partial \psi} \frac{d\psi}{d\eta} \tag{I:07}$$

and

$$\frac{\partial y}{\partial \xi} = \frac{\bar{q}}{q} \sin \theta = \frac{\partial y}{\partial \phi} \frac{d\phi}{d\xi}$$

$$\frac{\partial x}{\partial \xi} = \frac{\bar{q}}{q} \cos \theta = \frac{\partial x}{\partial \phi} \frac{d\phi}{d\xi} \tag{I:08}$$

Cross differentiating Eqs. (I:07) and (I:08) so as to eliminate x and and simplifying, results in

$$\frac{\partial}{\partial \eta} \left(\frac{\bar{q}}{q} \right) = -h \left(\frac{h\eta}{y} \right)^{\zeta-1} \frac{\partial \theta}{\partial \xi} \tag{I:09}$$

$$\frac{\bar{q}}{q}\frac{\partial \theta}{\partial \eta} = \frac{\partial}{\partial \xi}\left[h \left(\frac{h\eta}{y}\right)^{\zeta - 2} \right]$$

For the axially symmetric case ($\zeta = 3$) Eqs. (I:07a), and (I:08) furnish h, q, and y. However, for the two-dimensional case ($\zeta = 2$), only Eqs. (I:08) are needed. This seems reasonable on the grounds that the area in the latter case varies linearly with y; whereas in the axially symmetric case, the dependence is quadratic in nature.

Assuming x, y, q, and θ as in Eqs. (4:07) through (4:10) and substituting into the proper equations mentioned above, permits the coefficients of powers of η to be compared. The results have already been given in Eqs. (4:11) through (4:15).

In a similar fashion the quantities F, G, and H are determined. Since the design characteristic is at all points directed at the Mach angle, α, to the flow direction, it is described by

$$\frac{dy}{dx} = \tan(\theta - \alpha) \quad .$$

This relation may be formally expanded in terms of (ξ, η) and $\bar{h}$ and $\bar{M}$ to yield the form

$$\begin{aligned} 0 = \Big[d\xi \Big\{ 1 &+ \eta^2 \left[x_2' + \theta_1 y_1'\right] + \eta^4 \left[x_4' + \theta_1 y_3' + y_1' \left(\theta_3 + \frac{\theta_1^3}{3}\right)\right] \Big\} \\ &+ \sqrt{\bar{M}^2 - 1}\, d\eta \Big\{ y_1 + \left[\frac{f(\bar{M})\delta_2 y_1}{2} + 3y_3 - 2x_2\theta_1\right] \eta^2 + \Big[\Big(\frac{f(\bar{M})\delta_4}{2} \\ &+ \frac{y_1\delta_2^2 g(\bar{M})}{2} \Big) y_1 + 5y_5 - 4x_4\theta_1 - 2x_2 \left(\theta_3 + \frac{\theta_1^3}{3}\right) + \frac{f(\bar{M})\delta_2}{2} \\ &\times (3y_3 - 2x_2\theta_1) \Big] \eta^4 \Big\} \Big] \end{aligned} \qquad \text{(I:10)}$$

Where $f(\bar{M})$ and $g(\bar{M})$ are defined after Eqs. (4:17). Comparing Eqs. (I:10) and (4:16) yields the values indicated for F, G, and H in Eqs. (4:17).

APPENDIX II

DESIGN FOR A TWO-DIMENSIONAL CONTRACTION SECTION

Consider a source and sink at points B' and A', respectively, in the hodograph plane (Fig. 43). The streamlines in the physical plane then correspond to segments of circular arcs in the hodograph plane and the physical representation is as shown in Fig. 43, which it is seen may be used as a contraction section for a two-dimensional tunnel. Shaded portions in the two planes correspond.

Let the velocities at B' and A' be b and a, respectively, and let $F_* = \phi + i\psi$; then[40]

$$F_* (\bar{\omega}) = C \left[\ln(\bar{\omega} - b) - \ln(\bar{\omega} - a) \right] \qquad \text{(II:01)}$$

where C is a constant and $\bar{\omega} = (u - i v)$ is the complex conjugate velocity. In the physical, $z = x + i y$, plane

$$z = \int \frac{dF}{\bar{\omega}} = \int \left[\frac{e^{F/C} - 1}{a\, e^{F/C} - b} \right] dF \qquad \text{(II:02)}$$

$$= \frac{F}{b} + C\left(\frac{1}{a} - \frac{1}{b}\right) \ln\left(b - a\, e^{F/C}\right) + \text{constant}$$

$$z = x + i y = \left\{ \left[\frac{\phi}{b} + C\left(\frac{1}{a} - \frac{1}{b}\right) R \left\{ \ln\left[b - a\, e^{\phi/C} \left(\cos\frac{\psi}{C} + i \sin\frac{\psi}{C} \right) \right] \right\} \right] \right.$$
$$\left. + i \left[\frac{\psi}{b} + C\left(\frac{1}{a} - \frac{1}{b}\right) I \left\{ \ln\left[b - a\, e^{\phi/C} \left(\cos\frac{\psi}{C} + i \sin\frac{\psi}{C} \right) \right] \right\} \right] \right\} \qquad \text{(II:03)}$$

where R and I denote that the real and imaginary parts of the natural logarithm are to be taken. Assuming the constant of integration vanishes and using the principal value for the logarithm, the coordinates of the streamlines reduce to

$$x = \frac{\phi}{b} + C\left(\frac{1}{a} - \frac{1}{b}\right) \ln \left[\left(a\, e^{\phi/C}\right)^2 - 2ab\, e^{\phi/C} \cos\frac{\psi}{C} + b^2 \right]^{1/2} \qquad \text{(II:04)}$$

$$y = \frac{\psi}{b} + C\left(\frac{1}{a} - \frac{1}{b}\right) \arctan\left[\frac{\sin\frac{\psi}{C}}{\cos\frac{\psi}{C} - \frac{b}{a}\, e^{-\phi/C}}\right]$$

Due to the circular arcs which lie outside of the circle centered on $A'B'$ in the hodograph plane, the streamlines in the physical plane exhibit a repetitive nature. Therefore, the range of portrayal in the z-plane is restricted.

As an illustrative example, the streamlines for a 2:1 contraction ($a = 2$, $b = 1$, $C = 1$) have been computed and are shown in Fig. 44. The coordinates of Eq. (II:04) are in this case

$$x = \phi - \frac{1}{4} \ln\left[4e^{\phi}(e^{\phi} - \cos\psi) + 1\right]$$

$$y = \psi - \frac{1}{2} \arctan\left[\frac{2\sin\psi}{2\cos\psi - e^{-\phi}}\right] \qquad \text{(II:05)}$$

and as $\phi \to \infty$, $y \to (\psi/2)$ and as $\phi \to -\infty$, $y \to (\psi - \frac{\pi}{2})$. A constant velocity is achieved quite rapidly as evidenced by the virtually straight equipotential line $\phi = 3$ of Fig. 44.

Of further interest are those portions of the contraction streamlines having a favorable pressure gradient, which in effect is assured by a monotonically increasing velocity distribution. This condition is obviously not fulfilled along the $\psi = 0$ streamline, but the applicable region may be found easily.

For the desired monotone velocity distribution, $\partial|\bar{\omega}|/\partial\phi \geq 0$. From Eq. (II.01)

$$|\bar{\omega}| = \left[\frac{4e^{\phi}(e^{\phi} - \cos\psi) + 1}{e^{\phi}(e^{\phi} - 2\cos\psi) + 1}\right]^{1/2}$$

and so

$$\frac{\partial|\bar{\omega}|}{\partial\phi} = e^{\phi} \frac{3e^{\phi} - \cos\psi\,(1 + 2e^{2\phi})}{\left\{\left[4e^{\phi}(e^{\phi} - \cos\psi) + 1\right]\left[e^{\phi}(e^{\phi} - 2\cos\psi) + 1\right]^{3}\right\}^{1/2}} \qquad \text{(II:07)}$$

Thus

$$\partial|\bar{\omega}|/\partial\phi = 0$$

when either

$$e^{\phi} = 0$$

or

$$3e^{\phi} - \cos\psi(1 + 2e^{2\phi}) = 0 \quad . \tag{II:08}$$

The former corresponds to the constant velocity at $-\infty$; the latter has been added to Fig. 44 as a dashed line and divides the flow regime into increasing and decreasing velocity sections. The most outward streamline with a favorable pressure gradient is $\psi = \frac{\pi}{2}$.

Although the analysis applies to an incompressible fluid the usual compressible corrections may be applied. The method was successfully used in the design of a subsonic nozzle insert for the test section at the NSL. Operations have been carried out between Mach numbers of 0.55 and 0.85 with these blocks, the upper value being a function of specific models with regard to blocking.

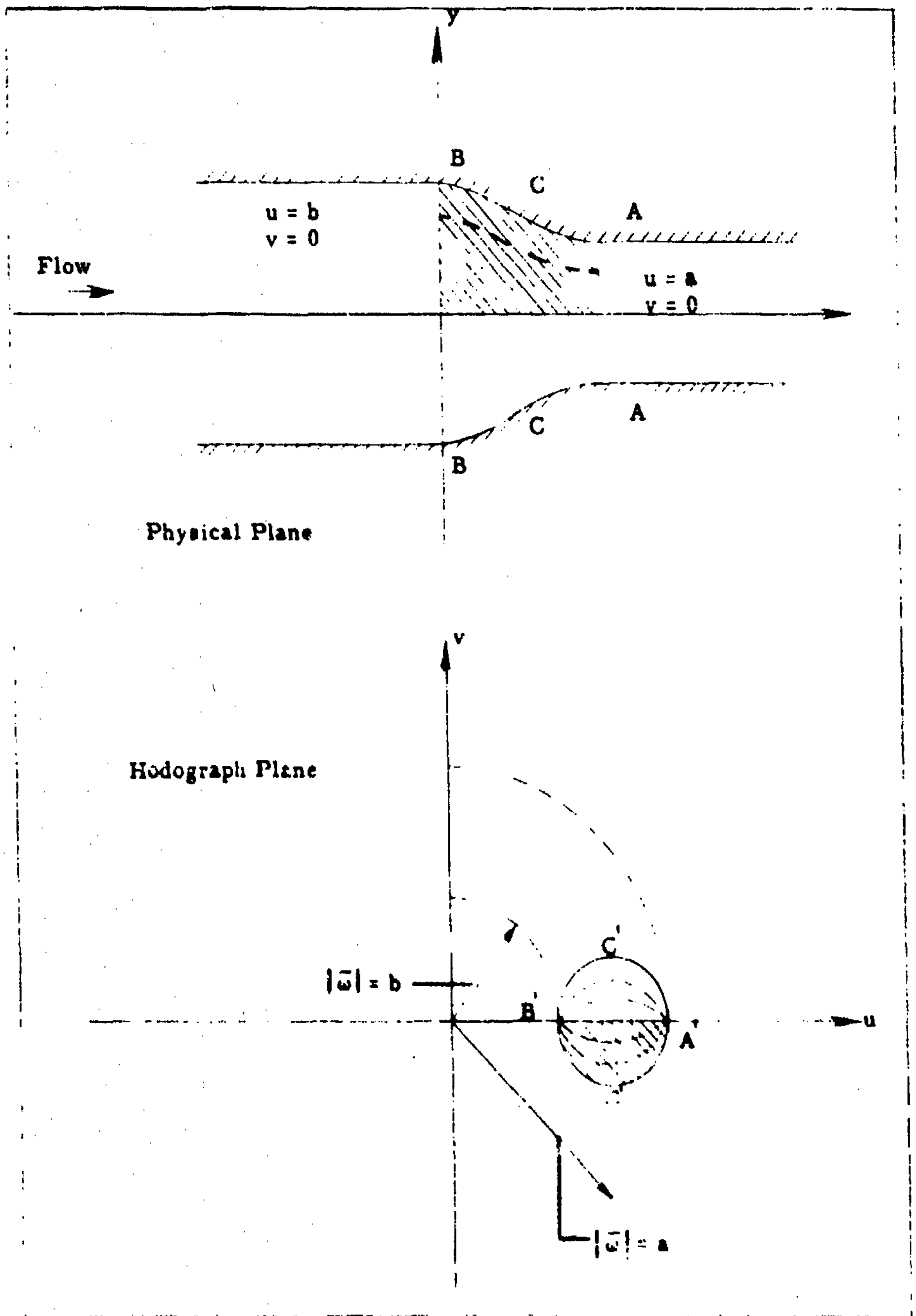

Fig. 43 Physical and hodograph planes for contraction analysis

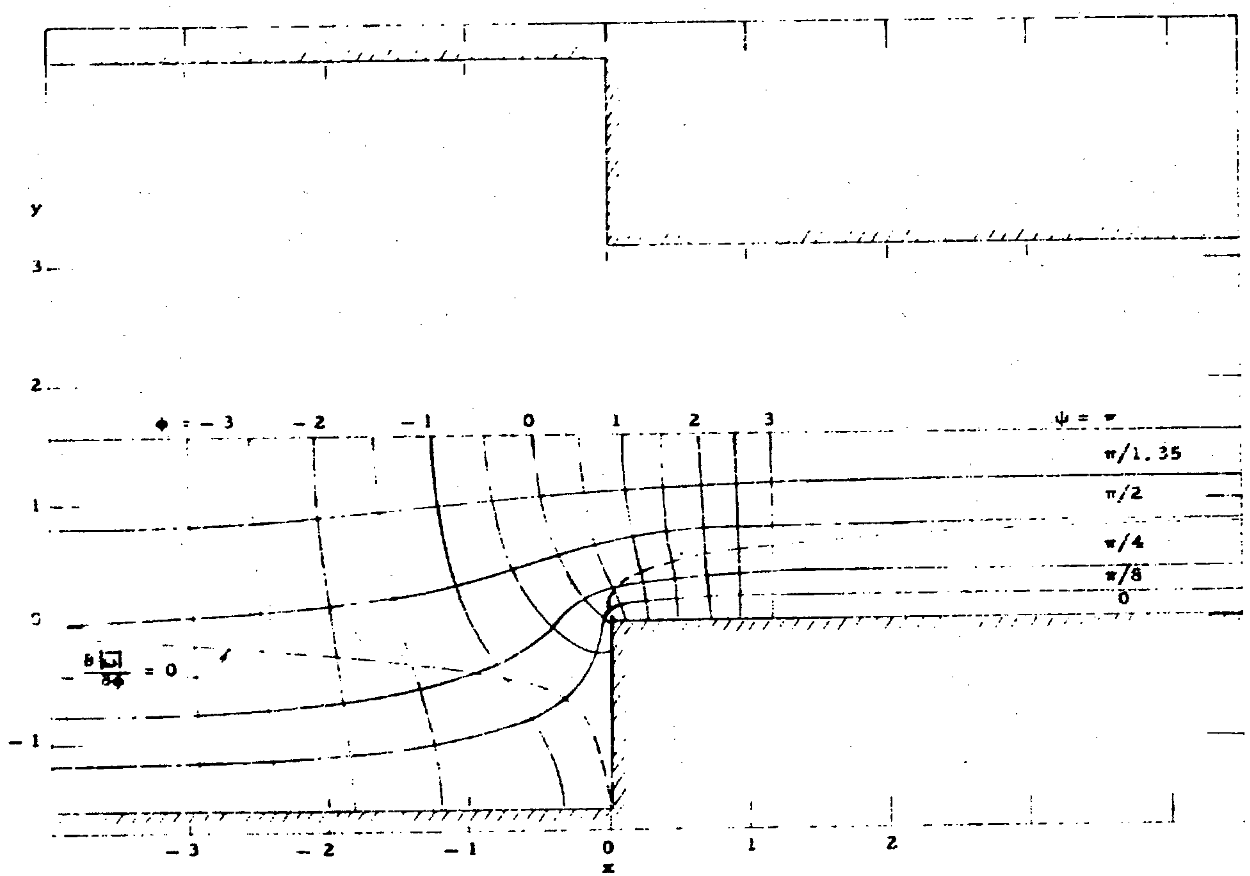

Fig. 44 Potential and streamlines for incompressible flow through 2:1 two-dimensional contraction

APPENDIX III

THE EFFECT OF NON-UNIFORM FLOW UPON STABILITY DATA

Assume that on a segment of the nozzle axis there exists a linear variation of M, so that $\phi_{xx} = U_x = k =$ constant, and in addition that the flow is symmetrical. From the linear wave equation, with $\beta^2 = M^2 - 1$,

$$\phi = f_1(x - \beta y) + f_2(x + \beta y) \qquad \text{(III:01)}$$

and since $\phi(x, y) = \phi(x, -y)$ it follows that $f_1 = f_2$. Therefore,

$$\phi = \frac{k}{4}\left[(x - \beta y)^2 + (x + \beta y)^2\right] = \frac{k}{2}\left[x^2 + \beta^2 y^2\right] \qquad \text{(III:02)}$$

and on the axis:

$$\begin{aligned} \phi_x &= kx \\ \phi_y &= k\beta^2 y \end{aligned} \qquad \text{(III:03)}$$

The flow inclination adjacent to the axis is

$$\alpha = \frac{\phi_y}{U} = \frac{k\beta^2 y}{U} \qquad \text{(III:04)}$$

and so the effective angle of attack of an airfoil located a distance ℓ_1 (positive forward) from the center of rotation becomes

$$\alpha_{eff} = \alpha_{set}\left(1 + \frac{k\beta^2 \ell_1}{U}\right) \qquad \text{(III:05)}$$

The true lift-curve slope is then

$$\left(\frac{dC_L}{d\alpha}\right)_{true} = \left(\frac{dC_L}{d\alpha}\right)_{meas.}\left(\frac{\alpha_{set}}{\alpha_{eff}}\right) = \frac{\left(dC_L/d\alpha\right)_{meas.}}{\left(1 + \frac{k\beta^2 \ell_1}{U}\right)} \qquad \text{(III:06)}$$

for a given component of the model.

The change in center of pressure location, due to the M gradient, can be estimated from the above relations. For an increment in lift coefficient on one of the surfaces, the shift of center of pressure (positive forward) is

$$\frac{\Delta \ell_2}{\ell_2} = \left[\frac{\Delta C_L}{C_{L(tot.)}}\right]\left[1 - \frac{\Delta C_L}{C_{L(tot.)}}\right]$$

$$= \frac{\Delta\left(\frac{dC_L}{d\alpha}\right)}{\left(\frac{dC_L}{d\alpha}\right)_{tot.}}\left[1 - \frac{\Delta\left(\frac{dC_L}{d\alpha}\right)}{\left(\frac{dC_L}{d\alpha}\right)_{tot.}}\right] \tag{III:07}$$

where ℓ_2 is the distance between the component and the over-all center of pressures. From Eq. (III:06)

$$\Delta\left(\frac{dC_L}{d\alpha}\right) \cong -\frac{k\beta^2 \ell_1}{U}\left(\frac{dC_L}{d\alpha}\right)$$

and so Eq. (III:07) reduces to

$$\frac{\Delta \ell_2}{\ell_2} \cong -\left(\frac{k\beta^2 \ell_1}{U}\right)\frac{\frac{dC_L}{d\alpha}}{\frac{dC_L}{d\alpha}_{tot.}}$$

which implies that for a positive M gradient (diverging flow) the true center of pressure lies aft of the measured position, and vice-versa for a negative gradient.

INDEX TO TABLES

$(\bar{\eta} = 1 + \xi^2)$

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Table 1

Potential-Flow Nozzle Coordinates and Mach-Number Variation

(a) $M_d = 1.500$, $\eta_d = 0.150$, $(\xi < \xi_I)$

ξ	x	y	M
-.0050	-.0048875	.1499914	1.0202
-.0100	-.0097750	.1499903	1.0156
-.0150	-.0146624	.1499967	1.0095
-.0200	-.0195498	.1500106	1.0043
-.0250	-.0244371	.1500320	.9988
-.0300	-.0293244	.1500608	.9932
-.0400	-.0390986	.1501408	.9821
-.0500	-.0488722	.1502507	.9711
-.0600	-.0586451	.1503905	.9602
-.0700	-.0684173	.1505597	.9490
-.0800	-.0781885	.1507592	.9386
-.0900	-.0879586	.1509882	.9280
-.1000	-.0977275	.1512469	.9174
-.1100	-.1074951	.1515352	.9069
-.1200	-.1172611	.1519532	.8965
-.1300	-.1270256	.1522008	.8862
-.1400	-.1367883	.1525779	.8760
-.1500	-.1465491	.1529846	.8659
-.1600	-.1563078	.1534208	.8559
-.1700	-.1660645	.1538859	.8456
-.1800	-.1758188	.1543817	.8366
-.1900	-.1855707	.1549062	.8263
-.2000	-.1953200	.1554602	.8166
-.2100	-.205067	.156044	.8070
-.2200	-.214810	.156656	.7976
-.2300	-.224551	.157298	.7882
-.2400	-.234289	.157969	.7789
-.2500	-.244023	.158670	.7696
-.2600	-.253755	.159399	.7605
-.2700	-.263482	.160158	.7515
-.2800	-.273206	.160946	.7426
-.2900	-.282926	.161763	.7337
-.3000	-.292643	.162609	.7250
-.3100	-.302355	.163484	.7164
-.3200	-.312063	.164388	.7078
-.3300	-.321766	.165321	.6994
-.3400	-.331466	.166283	.6910
-.3500	-.341160	.167[illegible]74	.6827
-.3600	-.350850	.168294	.6745
-.3700	-.360535	.169342	.6663
-.3800	-.370215	.170420	.6585
-.3900	-.379890	.171526	.6506
-.4000	-.389560	.172661	.6428
-.4100	-.399224	.173824	.6350
-.4200	-.408883	.175016	.6274
-.4300	-.418536	.176237	.6199
-.4400	-.428183	.177486	.6124
-.4500	-.437825	.178763	.6051

Table 1 (Continued)

(a) $M_d = 1.500$, $\eta_d = 0.150$, $(\xi < \xi_I)$

ξ	x	y	M
-.4600	-.447460	.180069	.5978
-.4700	-.457089	.181404	.5905
-.4800	-.466712	.182767	.5836
-.4900	-.476328	.184158	.5766
-.5000	-.485938	.185577	.5697
-.5100	-.495540	.187025	.5628
-.5200	-.505136	.188501	.5561
-.5300	-.514725	.190005	.5495
-.5400	-.524307	.191537	.5429
-.5500	-.533882	.193097	.5364
-.5600	-.543449	.19469	.5300
-.5700	-.553008	.19630	.5237
-.5800	-.562560	.19794	.5175
-.5900	-.572104	.19962	.5114
-.6000	-.581640	.20132	.5053
-.6100	-.591168	.20304	.4993
-.6200	-.600688	.20480	.4934
-.6300	-.610199	.20658	.4875
-.6400	-.619702	.20839	.4812
-.6500	-.629196	.21023	.4761
-.6600	-.638681	.21209	.4705
-.6700	-.648158	.21399	.4650
-.6800	-.657625	.21591	.4596
-.6900	-.667084	.21785	.4542
-.7000	-.676533	.21983	.4489

Table 1 (Continued)

(a) $M_d = 1.500$, $\eta_d = 0.150$, $(\xi < \xi_I)$

ξ	x	y	M
.0000	-.0000924	.1500182	1.0269
.0050	.0048875	.1500049	1.0326
.0100	.0097750	.1500396	1.0383
.0150	.0146624	.1500707	1.0440
.0200	.0195498	.1501093	1.0497
.0250	.0244371	.1501554	1.0555
.0300	.0293244	.1502090	1.0613
.0350	.0342115	.1502701	1.0671
.0400	.0390986	.1503387	1.0729
.0450	.0439855	.1504148	1.0787
.0500	.0488722	.1504985	1.0846
.0550	.0537588	.1505898	1.0905
.0600	.0586451	.1506885	1.0964
.0650	.0635313	.1507948	1.1023
.0700	.0684173	.1509086	1.1082
.0750	.0733030	.1510300	1.1141
.0800	.0781885	.1511590	1.1201
.0850	.0830737	.1512955	1.1261
0900	.0879586	.1514395	1.1321
.0950	.0928432	.1515912	1.1381
.1000	.0977275	.1517504	1.1441
.1050	.1026115	.1519172	1.1502
.1100	.1074951	.1520915	1.1562
.1150	.1123783	.1522735	1.1623
.1200	.1172611	.1524630	1.1684
.1250	.1221436	.1526602	1.1745
.1300	.1270256	.1528649	1.1806
.1350	.1319071	.1536772	1.1868
.1400	.1367883	.1532972	1.1929
.1450	.1416689	.1535248	1.1991
.1500	.1465491	.1537599	1.2053
.1550	.1514287	.1540028	1.2115
.1600	.1563078	.1542532	1.2177
.1650	.1611864	.1545113	1.2239
.1700	.1660645	.1547770	1.2302
.1750	.1709419	.1550503	1.2365
.1800	.1758188	.1553313	1.2427
.1850	.1806950	.1556200	1.2490
.1900	.1855707	.1559163	1.2553
.1950	.1904457	.1562203	1.2616
.2000	.1953200	.1565[illegible]20	1.2679
.2050	2001937	.1568513	1.2743
.2100	2050666	.1571783	1.2807
.2150	2099389	.1575131	1.2871
.2200	2148104	.1578555	1.2934
.2250	2196812	.1582055	1.2998
.2300	2245512	.1585634	1.3063
.2350	2294205	.1589290	1.3127
.2400	2342890	.1593022	1.3191

Table 1 (Continued)

(a) $M_d = 1.500$, $\eta_d = 0.150$, $(\xi < \xi_I)$

ξ	x	y	M
.2450	2391566	.1596839	1.3256
.2500	2440234	.1600719	1.3320
.2519887*	2459590	.1602288	1.3346
.2600	.25375	.1608[illegible]	1.3483
.2800	.27320	.16257	1.3746
.3000	.29264	.16439	1.4012
.3200	.31206	.16633	1.4280
.3400	.33147	.16840	1.4550
.3600	.35085	.17059	1.4822
.3800	.37022	.17292	1.5096
.4000	.38956	.17536	1.5371
.4200	.40888	.17794	1.5649
.4400	.42818	.18065	1.5929
.4600	.44746	.18348	1.6211
.4800	.46671	.18644	1.6494
.5000	.48594	.18954	1.6780
.5200	.50514	.19276	1.7068
.5400	.52431	.19612	1.7358
.5600	.54345	.19961	1.7650
.5800	.56256	.20324	1.7944
.6000	.58164	.20700	1.8241
.6200	.60069	.21089	1.8540
.6400	.61970	.21493	1.8842
.6600	.63868	.21910	1.9147
.6800	.65763	.22341	1.9454
.7000	.67654	.22787	1.9765
.7200	.69540	.23246	2.0079
.7400	.71423	.23720	2.0398
.7600	.73302	.24209	2.0719
.7800	.75177	.24712	2.1045
.8000	.77048	.25230	2.1375
.8200	.78914	.25763	2.1711
.8273946**	.79604	.29565	2.1380

*Inflection point for M = 1.50 nozzle
**Inflection point for M = 3.00 nozzle; η_d = 0.150 for both M = 1.50 and 3.00 nozzles.

Table 1 (Continued)

(a) $M_d = 1.500$, $\varphi_d = 0.150$, $(\xi > \xi_I)$

	ξ	x	y	M
ξ_d =	.4197225	.6169718	.1784251	1.5000
	.4175	.6113218	.1764211	1.4972
	.4150	.6049944	.1764071	1.4942
	.4125	.5986962	.1763833	1.4911
	.4100	.5924271	.1763497	1.4881
	.4075	.5861865	.1763066	1.4850
	.4050	.5799746	.1762541	1.4820
	.4025	.5737910	.1761924	1.4790
	.4000	.5676353	.1761215	1.4760
	.3975	.5615075	.1760416	1.4731
	.3950	.5554074	.1759536	1.4702
	.3925	.5493345	.1758556	1.4673
	.3900	.5432888	.1757497	1.4644
	.3875	.5372701	.1756354	1.4616
	.3850	.5312779	.1755127	1.4587
	.3825	.5253123	.1753820	1.4559
	.3800	.5193731	.1752434	1.4531
	.3775	.5134597	.1750966	1.4503
	.3750	.5075723	.1749422	1.4475
	.3725	.5017106	.1747802	1.4447
	.3700	.4958742	.1746107	1.4420
	.3675	.4900631	.1744338	1.4393
	.3650	.4842770	.1742497	1.4366
	.3625	.4785158	.1740584	1.4339
	.3600	.4727792	.1738601	1.4313
	.3575	.4670670	.1736549	1.4286
	.3550	.4613791	.1734430	1.4260
	.3525	.4557153	.1732245	1.4234
	.3500	.4500753	.1729993	1.4208
	.3475	.4444589	.1727678	1.4183
	.3450	.4388661	.1725300	1.4157
	.3425	.4332966	.1722860	1.4132
	.3400	.4277502	.1720359	1.4107
	.3375	.4222257	.1717798	1.4082
	.3350	.4167260	.1715179	1.4057
	.3325	.4112478	.1712502	1.4033
	.3300	.4057921	.1709769	1.4009
	.3275	.4003525	.1706975	1.3985
	.3250	.3949472	.1704138	1.3961
	.3225	.3895577	.1701243	1.3937
	.3200	.3841900	.1696[illegible]6	1.3914
	.3175	.3788438	.1695298	1.3890
	.3150	.3735190	.1692250	1.3867
	.3125	.3682545	.1689134	1.3844
	.3100	.3629330	.1686010	1.3822
	.3075	.3576716	.1682819	1.3799
	.3050	.3524309	.1679583	1.3777
	.3025	.3472108	.1676303	1.3755
	.3000	.3420113	.1672979	1.3733

Table 1 (Continued)

(a) $M_d = 1.500$, $\varphi_d = 0.150$, $(\xi > \xi_I)$

	ξ	x	y	M
$\xi_d =$	.4197225	.6169718	.1784251	1.5000
	.4175	.6113218	.1764211	1.4972
	.4150	.6049944	.1764071	1.4942
	.4125	.5986962	.1763833	1.4911
	.4100	.5924271	.1763497	1.4881
	.4075	.5861865	.1763066	1.4850
	.4050	.5799746	.1762541	1.4820
	.4025	.5737910	.1761924	1.4790
	.4000	.5676353	.1761215	1.4760
	.3975	.5615075	.1760416	1.4731
	.3950	.5554074	.1759536	1.4702
	.3925	.5493345	.1758556	1.4673
	.3900	.5432888	.1757497	1.4644
	.3875	.5372701	.1756354	1.4616
	.3850	.5312779	.1755127	1.4587
	.3825	.5253123	.1753820	1.4559
	.3800	.5193731	.1752434	1.4531
	.3775	.5134597	.1750966	1.4503
	.3750	.5075723	.1749422	1.4475
	.3725	.5017106	.1747802	1.4447
	.3700	.4958742	.1746107	1.4420
	.3675	.4900631	.1744338	1.4393
	.3650	.4842770	.1742497	1.4366
	.3625	.4785158	.1740584	1.4339
	.3600	.4727792	.1738601	1.4313
	.3575	.4670670	.1736549	1.4286
	.3550	.4613791	.1734430	1.4260
	.3525	.4557153	.1732245	1.4234
	.3500	.4500753	.1729993	1.4208
	.3475	.4444589	.1727678	1.4183
	.3450	.4388661	.1725300	1.4157
	.3425	.4332966	.1722860	1.4132
	.3400	.4277502	.1720359	1.4107
	.3375	.4222237	.1717798	1.4082
	.3350	.4167260	.1715179	1.4057
	.3325	.4112478	.1712502	1.4033
	.3300	.4057921	.1709769	1.4009
	.3275	.4003525	.1706975	1.3985
	.3250	.3949472	.1704138	1.3961
	.3225	.3895577	.1701243	1.3937
	.3200	.3841900	.1698[illegible]6	1.3914
	.3175	.3788438	.1695298	1.3890
	.3150	.3735190	.1692250	1.3867
	.3125	.3682545	.1689134	1.3844
	.3100	.3629330	.1686010	1.3822
	.3075	.3576716	.1682819	1.3799
	.3050	.3524309	.1679583	1.3777
	.3025	.3472108	.1676303	1.3755
	.3000	.3420113	.1672979	1.3733

Table 1 (Continued)

(a) $M_d = 1.500$, $\eta_d = 0.150$, $(\xi > \xi_I)$

ξ	x	y	M
.2975	.3368321	.1669613	1.3711
.2950	.3316732	.1666206	1.3689
.2925	.3265342	.1662760	1.3668
.2900	.3214153	.1659274	1.3647
.2875	.3163162	.1655751	1.3626
.2850	.3112367	.1652190	1.3605
.2825	.3061769	.1648595	1.3584
.2800	.3011364	.1644965	1.3564
.2775	.2961153	.1641301	1.3543
.2750	.2911135	.1637606	1.3523
.2725	.2861307	.1633879	1.3503
.2700	.2811670	.1630123	1.3483
.2675	.2762221	.1626338	1.3464
.2650	.2712961	.1622525	1.3444
.2625	.2663889	.1618686	1.3425
.2600	.2615002	.1614823	1.3406
.2575	.2566302	.1610936	1.3387
.2550	.2517786	.1607025	1.3368
.2525	.2469455	.1603093	1.3350

Table 1 (Continued)

(b) $M_d = 1.712$, $\eta_d = 0.194$, $(\xi < \xi_I)$

ξ	x	y	M
-.0050	-.0048118	.19398	1.039
-.0100	-.0096236	.19397	1.033
-.0150	-.0144350	.19396	1.028
-.0200	-.019247	.19397	1.022
-.0250	-.024059	.19399	1.016
-.0300	-.028870	.19401	1.010
-.0350	-.033681	.19406	1.005
-.0400	-.038492	.19410	.999
-.0450	-.043303	.19415	.994
-.0500	-.048114	.19421	.988
-.0550	-.052924	.19430	.982
-.0600	-.057734	.19438	.977
-.0650	-.062543	.19447	.971
-.0700	-.067353	.19457	.966
-.0750	-.072161	.19469	.960
-.0800	-.076970	.19481	.955
-.0850	-.081778	.19494	.949
-.0900	-.086585	.19508	.944
-.0950	-.091392	.19524	.938
-.1000	-.096199	.19539	.933
-.1050	-.10100	.19556	.928
-.1100	-.10581	.19574	.922
-.1150	-.11062	.19593	.917
-.1200	-.11542	.19613	.912
-.1250	-.12022	.19634	.907
-.1300	-.12502	.19655	.901
-.1350	-.12983	.19678	.896
-.1400	-.13463	.19702	.891
-.1450	-.13943	.19727	.886
-.1500	-.14423	.19752	.880
-.1550	-.14903	.19778	.875
-.1600	-.15382	.19806	.870
-.1650	-.15862	.19834	.865
-.1700	-.16342	.19864	.860
-.1750	-.16821	.19891	.855
-.1800	-.17301	.19925	.850
-.1850	-.17780	.19957	.845
-.1900	-.18259	.19990	.840
-.1950	-.18738	.20024	.835
-.2000	-.19217	.2005[illegible]	.830
-.2050	-.19696	.20095	.826
-.2100	-.20175	.20132	.821
-.2150	-.20653	.20170	.816
-.2200	-.21132	.20208	.811
-.2250	-.21610	.20248	.806
-.2300	-.22089	.20288	.802
-.2350	-.22567	.20330	.797
-.2400	-.23045	.20372	.792
-.2450	-.23522	.20416	.787

Table 1 (Continued)

(b) $M_d = 1.712$, $\eta_d = 0.194$, $(\xi < \xi_I)$

ξ	x	y	M
-.2500	-.24000	.20460	.783
-.2550	-.24478	.20505	.778
-.2600	-.24955	.20551	.773
-.2650	-.25433	.20598	.769
-.2700	-.25910	.20646	.764
-.2750	-.26387	.20695	.760
-.2800	-.26863	.20745	.755
-.2850	-.27340	.20796	.751
-.2900	-.27817	.20847	.746
-.2950	-.28293	.20900	.742
-.3000	-.28769	.20953	.738

Table 1 (Continued)

(b) $M_d = 1.712$, $\eta_d = 0.194$, $(\xi < \xi_I)$

ξ	x	y	M
.0000	-.0002586	.1940660	1.045
.0100	.0096236	.19407	1.057
.0200	.01925	.19418	1.068
.0300	.02887	.19434	1.080
.0400	.03849	.19452	1.092
.0500	.04811	.19475	1.104
.0600	.05773	.19502	1.116
.0700	.06735	.19533	1.128
.0800	.07697	.19567	1.140
.0900	.08659	.19606	1.153
.1000	.09620	.19648	1.165
.1100	.10581	.19695	1.178
.1200	.11542	.19745	1.190
.1300	.12502	.19799	1.203
.1400	.13463	.19858	1.215
.1500	.14423	.19920	1.228
.1600	.15382	.19986	1.241
.1700	.16342	.20056	1.254
.1800	.17301	.20131	1.267
.1900	.18259	.20209	1.280
.2000	.19217	.20291	1.293
.2100	.20175	.20377	1.306
.2200	.21132	.20468	1.320
.2300	.22089	.20562	1.333
.2400	.23045	.20661	1.346
.2500	.24000	.20763	1.359
.2600	.24955	.20870	1.373
.2700	.25910	.20981	1.387
.2800	.26863	.21095	1.400
.2900	.27817	.21215	1.414
.3000	.28769	.21338	1.428
.30471*	.29216	.21397	1.4344

*Inflection point for M = 1.712 nozzle

Table 1 (Continued)

(b) $M_d = 1.712,\ \eta_d = 0.194,\ (\xi > \xi_I)$

ξ	x	y	M
$\xi_d =$ .59077	.95444	.26171	1.7120
.5850	.93788	.26167	1.7049
.5800	.92369	.26160	1.6988
.5750	.90966	.26150	1.6927
.5700	.89566	.26133	1.6868
.5650	.88184	.26112	1.6809
.5600	.86813	.26090	1.6750
.5550	.85451	.26061	1.6692
.5500	.84101	.26029	1.6634
.5450	.82765	.25995	1.6576
.5400	.81435	.25955	1.6520
.5350	.80121	.25913	1.6463
.5300	.78816	.25866	1.6407
.5250	.77522	.25818	1.6352
.5200	.76237	.25765	1.6297
.5150	.74962	.25708	1.6242
.5100	.73699	.25650	1.6188
.5050	.72446	.25587	1.6135
.5000	.71202	.25522	1.6081
.4950	.69967	.25454	1.6029
.4900	.68741	.25383	1.5977
.4850	.67527	.25310	1.5925
.4800	.66322	.25234	1.5874
.4750	.65124	.25154	1.5823
.4700	.63937	.25072	1.5773
.4650	.62759	.24989	1.5723
.4600	.61589	.24901	1.5673
.4550	.60428	.24814	1.5624
.4500	.59276	.24721	1.5576
.4450	.58131	.24628	1.5528
.4400	.56998	.24534	1.5480
.4350	.55872	.24436	1.5433
.4300	.54753	.24337	1.5386
.4250	.53643	.24234	1.5340
.4200	.52540	.24132	1.5294
.4150	.51446	.24026	1.5249
.4100	.50360	.23920	1.5204
.4050	.49233	.23811	1.5159
.4000	.48211	.23700	1.5114
.3950	.47149	.23589	1.5071
.3900	.46095	.234[illegible]5	1.5028
.3850	.45047	.23361	1.7985
.3800	.44006	.23245	1.4942
.3750	.42973	.23128	1.4900
.3700	.41947	.23009	1.4858
.3650	.40931	.22891	1.4817
.3600	.39919	.22770	1.4776
.3550	.38915	.22649	1.4735
.3500	.37919	.22526	1.4695

Table 1 (Continued)

(b) $M_d = 1.712$, $\eta_d = 0.194$, $(\xi > \xi_I)$

ξ	x	y	M
.3450	.36930	.22404	1.4655
.3400	.35949	.22280	1.4615
.3350	.34973	.22156	1.4576
.3300	.34006	.22032	1.4537
.3250	.33046	.21907	1.4498
.3200	.32091	.21781	1.4460
.3150	.31144	.21655	1.4422
.3100	.30204	.21530	1.4384
.3050	.29271	.21404	1.4346

Table 1 (Continued)

(c) $M_d = 2.250$, $\eta_d = 0.200$, $(\xi < \xi_I)$

ξ	x	y	M
-.0150	-.0146814	.2000307	1.0339
-.0200	-.0194752	.2000353	1.0281
-.0250	-.0242748	.2000499	
-.0300	-.0290715	.2000743	
-.0350	-.0338683	.2001091	
-.0400	-.0386420	.2001536	1.0051
-.0450	-.0434617	.2002081	
-.0500	-.0482583	.2002725	
-.0600	-.0578510	.2004311	.9825
-.0700	-.0674430	.2006294	
-.0800	-.0770339	.2009672	.9602
-.0900	-.0866236	.2011446	
-.1000	-.0962118	.2014613	.9383
-.1100	-.1057983	.2018174	
-.1200	-.1153827	.2022128	.9168
-.1300	-.1249649	.2026473	
-.1400	-.1345446	.2031210	.8958
-.1500	-.1441216	.2036337	
-.1600	-.1536956	.2041854	.8750
-.1700	-.1632663	.2047760	
-.1800	-.1728336	.2054055	
-.1900	-.1823973	.2060737	
-.2000	-.1919570	.2067806	.8349
-.2100	-.2015125	.2075260	
-.2200	-.2110637	.2083101	
-.2300	-.2206102	.2091326	
-.2400	-.2301518	.2099935	.7962
-.2500	-.2396884	.2108927	
-.2600	-.2992196	.2118301	
-.2700	-.2587453	.2128057	
-.2800	-.2682652	.2138194	.7592
-.2900	-.2777791	.2148711	
-.3000	-.2872868	.2159608	
-.3100	-.2967880	.2170883	
-.3200	-.3062826	.2182535	.7238
-.3300	-.3157702	.2194565	
-.3400	-.3255207	.2206971	
-.3500	-.3347239	.2219753	
-.3600	-.3441895	.2232909	.6900
-.3700	-.3536473	.2296438	
-.3800	-.3630971	.2260341	
-.3900	-.3725387	.2274616	
-.4000	-.3819718	.2289262	.6577
-.4100	-.3923963	.2304278	
-.4200	-.4008120	.2315664	
-.4300	-.4102186	.2335419	
-.4400	-.4196159	.2351541	.6269
-.4500	-.4290036	.2368070	
-.4600	-.4383817	.2384885	

Table 1 (Continued)

(c) $M_d = 2.250$, $\eta_d = 0.200$, $(\xi < \xi_I)$

ξ	x	y	M
-.4700	-.4477499	.2402106	
-.4800	-.4571079	.2419690	.5977
-.4900	-.4664557	.2437637	
-.5000	-.4757929	.2455948	
-.5100	-.4851193	.2474619	
-.5200	-.4944348	.2493650	.5698
-.5300	-.5037392	.2513041	
-.5400	-.5130322	.2532790	
-.5500	-.5223137	.2552897	
-.5600	-.5315835	.2573360	.5434
-.5700	-.5408413	.2594179	
-.5800	-.5500870	.2615351	
-.5900	-.5593204	.2636877	
-.6000	-.5685412	.2658756	.5184
-.6100	-.5777494	.2680985	
-.6200	-.5869446	.2703565	
-.6300	-.5961268	.2726494	
-.6400	-.6052956	.2749771	.4947
-.6500	-.6144510	.2773394	
-.6600	-.6235928	.2797364	
-.6700	-.6327207	.2821678	
-.6800	-.6418346	.2846336	.4722
-.6900	-.6509343	.2871336	
-.7000	-.6600196	.2896677	
-.7100	-.6690903	.2922358	
-.7200	-.6781463	.2948378	.4501
-.7300	-.6871874	.2974736	
-.7400	-.6962135	.3001431	
-.7500	-.7052242	.3028461	
-.7600	-.7142195	.3055825	.4309
-.7700	-.7231993	.3083522	
-.7800	-.7321632	.3111550	
-.7900	-.74111[illegible]2	.3139909	
-.8000	-.7500431	.3168598	.4119
-.8100	-.7589588	.3197614	
-.8200	-.7678580	.3226957	
-.8300	-.7767406	.3256625	
-.8400	-.7856064	.3286616	.3939
-.8500	-.7944554	.3316933	
-.8600	-.8032873	.3347570	
-.8700	-.8121019	.33785[illegible]7	
-.8800	-.8208992	.3405864	.3769
-.8900	-.8296790	.3441397	
-.9000	-.8384411	.3473307	
-.9100	-.8471854	.3505532	
-.9200	-.8559117	.3538071	.3609
-.9300	-.8646199	3570927	
-.9400	-.8733099	.3604083	
-.9500	-.8819815	.3637555	

Table 1 (Continued)

(c) $M_d = 2.250$, $\eta_d = 0.200$, $(\xi < \xi_I)$

ξ	x	y	M
-.9600	-.8906345	.3671335	.3457
-.9700	-.8992689	.3705421	
-.9800	-.9078844	.3739813	
-.9900	-.9164811	.3774509	

Table 1 (Continued)

(c) $M_d = 2.250$, $\eta_d = 0.200$, $(\xi < \xi_I)$

ξ	x	y	M
.0000	-.0002921	.2000768	1.0502
.0125	.0116973	.2001842	1.0663
.0150	.0140954	.2002132	1.0693
.0175	.0164931	.2002448	1.0723
.0200	.0188907	.2002788	1.0753
.0250	.0236856	.2003545	1.0813
.0300	.0284802	.2004402	1.0873
.0350	.0332744	.2005360	1.0933
.0400	.0380682	.2006420	1.0994
.0450	.0428615	.2007580	1.1055
.0500	.0476544	.2008842	1.1116
.0550	.0524467	.2010205	
.0600	.0572384	.2011670	1.1239
.0650	.0620295	.2013237	
.0700	.0668200	.2014905	1.1363
.0750	.0716099	.2016675	
.0800	.0763990	.2018547	1.1487
.0850	.0811874	.2020521	
.0900	.0859751	.2022597	1.1613
.0950	.0907619	.2024776	
.1000	.0955479	.2027057	1.1740
.1050	.1003330	.2029441	
.1100	.1051172	.2031928	1.1867
.1150	.1099005	.2034517	
.1200	.1146827	.2037210	1.1995
.1250	.1194640	.2040005	
.1300	.1242442	.2042904	1.2124
.1350	.1290233	.2045907	
.1400	.1338013	.2049013	1.2254
.1450	.1385781	.2052223	
.1500	.1433537	.2055536	1.2385
.1550	.1481281	.2058954	
.1600	.1529013	.2062476	1.2517
.1650	.15767[illegible]1	.2066102	
.1700	.1624435	.2069833	1.2650
.1750	.1672126	.2073668	
.1800	.1719802	.2077608	1.2783
.1850	.1767464	.2081653	
.1900	.1815111	.2085804	1.2918
.1950	.1862742	.2090059	
.2000	.1910358	.2094421	1.3053
.2050	.1957957	.20988[illegible]8	
.2100	.2005540	.2103460	1.318[illegible]
.2150	.2053106	.2108139	
.2200	.2100655	.2112924	1.3326
.2250	.2148186	.2117816	
.2300	.2195699	.2122814	1.3463
.2350	.2243193	.2127919	
.2400	.2290668	.2133131	1.3602

Table I (Continued)

(c) $M_d = 2.250,\ \eta_d = 0.200,\ (\xi < \xi_I)$

ξ	x	y	M
.2450	.2338124	.2138451	
.2500	.2385560	.2143877	1.3742
.2550	.2432976	.2149412	
.2600	.2480371	.2155054	1.3882
.2650	.2527745	.2160805	
.2700	.2575098	.2166664	1.4023
.2750	.2622429	.2172631	
.2800	.2669738	.2178707	1.4166
.2850	.2717024	.2184893	
.2900	.2764286	.2191187	1.4309
.2950	.2811526	.2197591	
.3000	.2858741	.2204105	1.4453
.3050	.2905931	.2210729	
.3100	.2953097	.2217464	1.4598
.3150	.3000237	.2224309	
.3200	.3047352	.2231265	1.4743
.3250	.3094440	.2238332	
.3300	.3141502	.2245510	1.4890
.3350	.3188536	.2252801	
.3400	.3235543	.2260203	1.5038
.3450	.3282521	.2267718	
.3500	.3329471	.2275345	1.5187
.3550	.3376392	.2283085	
.3600	.3423284	.2290939	1.5336
.3650	.3470145	.2298906	
.3700	.3516976	.2306988	1.5487
.3750	.3563775	.2315183	
.3800	.3610544	.2323494	1.5638
.3850	.3657280	.2331919	
.3900	.3703984	.2340460	1.5791
.3950	.3750655	.2349117	
.4000	.3797292	.2357889	1.5945
.4050	.3843895	.2366779	
.4100	.3890464	.2375785	1.6100
.4150	.3936997	.2384909	
.4200	.3983495	.2394150	1.6255
.4250	.4029957	.2403510	
.4300	.4076382	.2412989	1.6412
.4350	.4122770	.2422586	
.4400	.4169120	.2432303	1.6570
.4450	.4215432	.2442140	
.4500	.4261705	.2452098	1.6730
.4550	.4307938	.24621[illegible]6	
.4600	.4354132	.2472376	1.6890
.4650	.4400285	.2482698	
.4700	.4446397	.2493142	1.7052
.4750	.4492467	.2503710	
.4800	.4538494	.2514401	1.7215
.4850	.4584479	.2525216	

Table 1 (Continued)

(c) $M_d = 2.250$, $\eta_d = 0.200$, $(\xi < \xi_I)$

ξ	x	y	M
.4870485*	.4603306	.2529683	
.4900	.4630421	.2536155	1.7400
.4950	.4676318	.2547220	
.5000	.4722170	.2558410	1.7545
.5050	.4767977	.2569727	
.5100	.4813738	.2581171	1.7712
.5150	.4859453	.2592743	
.5200	.4905120	.2604442	1.7880
.5250	.4950740	.2616271	
.5300	.4996311	.2628229	1.8050
.5350	.5041833	.2640317	
.5400	.5087305	.2652536	1.8221
.5450	.5132726	.2664886	
.5500	.5178097	.2677369	1.8394
.5550	.5223415	.2689985	
.55805**	.52877	.26833	1.8110

*Inflection point for M = 2.250 nozzle

**Inflection point for M = 2.500 nozzle; η_d = 0.200 for both M = 2.250 and 2.500 nozzles.

Table 1 (Continued)

(c) $M_d = 2.250$, $\eta_d = 0.200$, $(\xi > \xi_I)$

ξ	x	y	M
ξ_d =1.0471079	1.8922079	.4192871	2.2500
1.0450	1.8846874	.4192830	
1.0400	1.8869375	.4192425	2.2421
1.0350	1.8493124	.4191586	
1.0300	1.8318105	.4190324	2.2311
1.0250	1.8144306	.4188639	
1.0200	1.7971709	.4186542	2.2201
1.0150	1.7800304	.4184038	
1.0100	1.7630074	.4181124	
1.0050	1.7461010	.4177834	2.2038
1.0000	1.7293099	.4174147	2.1984
.9950	1.7126326	.4170074	
.9900	1.6960681	.4165627	
.9850	1.6796152	.4160808	
.9800	1.6632727	.4155622	2.1769
.9750	1.6470395	.4150077	
.9700	1.6309142	.4144177	
.9650	1.6148961	.4137928	
.9600	1.5989840	.4131334	2.1557
.9550	1.5831768	.4124402	2.1505
.9500	1.5674734	.4117136	
.9450	1.5518729	.4109542	
.9400	1.5363742	.4101623	2.1349
.9350	1.5209766	.4093384	
.9300	1.5056786	.4084834	2.1245
.9250	1.4904796	.4075972	
.9200	1.4753787	.4066806	2.1142
.9150	1.4603749	.4057339	
.9100	1.4454672	.4047576	
.9050	1.4306549	.4037523	2.0990
.9000	1.4159368	.4027182	2.0939
.8950	1.4013125	.4016558	
.8900	1.3867807	.4005657	
.8850	1.3723409	.3994480	
.8800	1.3579920	.3983034	2.0738
.8750	1.3437335	.3971320	
.8700	1.3295643	.3959345	
.8650	1.3154836	.3947112	
.8600	1.3014908	.3934626	2.0540
.8550	1.2875851	.3921888	2.0491
.8500	1.2737657	.39[illegible]903	
.9450	1.2600317	.3895376	
.8400	1.2463826	.3882209	2.0345
.8350	1.2328175	.3868507	
.8300	1.2193356	.3854573	2.0249
.8250	1.2059368	.3840408	
.8200	1.1926195	.3826020	2.0153
.8150	1.1793835	.3811410	
.8100	1.1662280	.3796584	

Table 1 (Continued)

(c) $M_d = 2.250$, $\eta_d = 0.200$, $(\xi > \xi_I)$

ξ	x	y	M
.8050	1.1531524	.3781540	2.0010
.8000	1.1401560	.3766286	1.9964
.7950	1.1272382	.3750824	
.7900	1.1143981	.3735157	
.7850	1.1016353	.3719288	
.7800	1.0889491	.3703221	1.9776
.7450	1.0763388	.3686958	
.7700	1.0638038	.3670504	
.7650	1.0513436	.3653859	
.7600	1.0389574	.3637030	1.9592
.7550	1.0266348	.3620018	1.9547
.7500	1.0144051	.3602826	
.7450	1.0022375	.3585458	
.7400	.9901418	.3567916	1.9411
.7350	.9781173	.3550204	
.7300	.9661634	.3532324	1.9321
.7250	.9542794	.3514280	
.7200	.9424651	.3496075	1.9233
.7150	.9307196	.3477710	
.7100	.9190425	.3459192	
.7050	.9074332	.3440521	1.9100
.7000	.8958913	.3421702	1.9056
.6950	.8844163	.3402735	
.6900	.8730075	.3383627	
.6850	.8616646	.3364378	
.6800	.8503868	.3344994	1.8883
.6750	.8391740	.3325475	
.6700	.8280254	.3305827	
.6650	.8169406	.3286051	
.6600	.8059191	.3266157	1.8717
.6550	.7949605	.3246133	1.8670
.6500	.7840643	.3225997	
.6450	.7732300	.3205746	
.6400	.7624571	.3185386	1.8545
.6350	.7517453	.3164919	
.6300	.7410940	.3144348	1.8461
.6250	.7305027	.3123678	
.6200	.7199711	.3102912	1.8379
.6150	.7094987	.3082053	
.6100	.6990852	.3061109	
.6050	.6887299	.3040072	1.8256
.6000	.6784325	.3018[illegible]59	1.8[illegible]15
.5950	.6681926	.2997768	
.5900	.6580098	.2976503	
.5850	.6478836	.2955169	
.5800	.6378136	.2933771	1.8054
.5750	.6277994	.2912311	
.5700	.6178406	.2890794	
.5650	.6079367	.2869225	

Table 1 (Continued)

(c) $M_d = 2.250$, $\eta_d = 0.200$, ($\xi > \xi_I$)

ξ	x	y	M
.5600	.5980874	.2847607	1.7895
.5550	.5882923	.2825947	1.7856
.5500	.5785509	.2804246	
.5450	.5688628	.2782512	
.5400	.5592277	.2760747	1.7738
.5350	.5496451	.2738957	
.5300	.5401146	.2717147	
.5250	.5306358	.2695322	
.5200	.5212084	.2673486	1.7583
.5150	.5118318	.2651645	
.5100	.5025058	.2629803	
.5050	.4932298	.2607966	1.7467
.5000	.4840035	.2586140	1.7429
.4950	.4748266	.2564329	
.4900	.4656985	.2542539	

Table 1 (Continued)

(d) $M_d = 2.500$, $\eta_d = 0.200$, $(\xi > \xi_I)^*$

ξ	x	y	M
ξ_d = 1.27934	2.48765	.52735	2.5000
1.2700	2.44962	.52764	
1.2600	2.41054	.52733	2.4800
1.2500	2.37172	.52700	
1.2400	2.33363	.52637	2.4595
1.2300	2.29577	.52568	
1.2200	2.25855	.52480	2.4392
1.2100	2.22163	.52383	
1.2000	2.18539	.52259	2.4190
1.1900	2.14928	.52135	
1.1800	2.11386	.51991	2.3991
1.1700	2.07862	.51838	
1.1600	2.04403	.51664	2.3792
1.1500	2.00967	.51485	
1.1400	1.97583	.51287	2.3596
1.1300	1.94221	.51084	
1.1200	1.90916	.50862	2.3400
1.1100	1.87638	.50635	
1.1000	1.84406	.50388	2.3206
1.0900	1.81192	.50141	
1.0800	1.78030	.49873	2.3013
1.0700	1.74895	.49603	
1.0650	1.73341	.49456	
1.0600	1.71807	.49312	2.2821
1.0550	1.70270	.49168	
1.0500	1.68738	.49021	
1.0450	1.67222	.48869	
1.0400	1.65713	.48712	2.2630
1.0350	1.64212	.48558	
1.0300	1.62710	.48402	
1.0250	1.61228	.48240	
1.0200	1.59752	.48075	2.2441
1.0150	1.58278	.47910	
1.0100	1.56816	.47741	
1.0050	1.55365	.47570	
1.0000	1.53925	.47395	2.2252
.9950	1.52480	.47219	
.9900	1.51049	.47044	
.9850	1.49627	.46862	
.9800	1.48217	.46631	2.2063
.9750	1.46805	.46456	
.9700	1.45405	.46311	
.9650	1.44014	.46172	
.9600	1.42637	.45931	2.1876
.9550	1.41253	.45740	
.9500	1.39881	.45545	
.9450	1.38523	.45345	
.9400	1.37170	.45149	2.1689
.9350	1.35816	.44946	

*See Table 1 (c) for coordinates upstream of inflection point.

Table 1 (Continued)

(d) $M_d = 2.500,\ \eta_d = 0.200,\ (\xi > \xi_I)$.

ξ	x	y	M
.9300	1.34475	.44747	
.9250	1.33141	.44542	
.9200	1.31822	.44337	2.1502
.9150	1.30497	.44130	
.9100	1.29183	.43922	
.9050	1.27883	.43707	
.9000	1.26586	.43494	2.1315
.8950	1.25293	.43279	
.8900	1.24005	.43063	
.8850	1.22733	.42845	
.8800	1.21465	.42624	2.1129
.8750	1.20198	.42403	
.8700	1.18939	.42181	
.8650	1.17692	.41958	
.8600	1.16453	.41729	2.0943
.8550	1.15215	.41503	
.8500	1.13985	.41273	
.8450	1.12768	.41044	
.8400	1.11557	.40811	2.0757
.8350	1.10346	.40579	
.8300	1.09139	.40345	
.8250	1.07943	.40109	
.8200	1.06758	.39871	2.0571
.8150	1.05571	.39634	
.8100	1.04393	.39397	
.8050	1.03224	.39156	
.8000	1.02064	.38914	2.0385
.7950	1.00903	.38671	
.7900	.99750	.38429	
.7850	.98606	.38185	
.7800	.97470	.37940	2.0199
.7750	.96334	.37695	
.7700	.95207	.37448	
.7650	.94092	.37203	
.7600	.92979	.36953	2.0013
.7550	.91866	.36702	
.7500	.90764	.36452	
.7450	.89672	.36204	
.7400	.88587	.35954	1.9826
.7350	.87499	.35702	
.7300	.86420	.3545[illegible]	
.7250	.85352	.35199	
.7200	.84290	.34947	1.9639
.7150	.83227	.34693	
.7100	.82175	.34440	
.7050	.81128	.34186	
.7000	.80092	.33933	1.9452
.6950	.79053	.33679	
.5900	.78022	.33426	

Table 1 (Continued)

(d) $M_d = 2.500$, $\eta_d = 0.200$, $(\xi > \xi_I)$

ξ	x	y	M
.6850	.77001	.33171	
.6800	.75987	.32918	1.9264
.6750	.74971	.32663	
.6700	.73963	.32408	
.6650	.72959	.32153	
.6600	.71972	.31901	1.9076
.6550	.70980	.31646	
.6500	.69994	.31393	
.6450	.69017	.31141	
.6400	.68049	.30888	1.8888
.6350	.67077	.30633	
.6300	.66115	.30382	
.6250	.65159	.30130	
.6200	.64214	.29880	1.8699
.6150	.63264	.29629	
.6100	.62322	.29379	
.6050	.61391	.29130	
.6000	.60465	.28884	1.8510
.5950	.59538	.28634	
.5900	.58618	.28387	
.5850	.57707	.28143	
.5800	.56803	.27899	1.8319
.5750	.55897	.27653	
.5700	.54996	.27408	
.5650	.54107	.27168	
.5600	.53223	.26927	1.8129

Table 1 (Continued)

(c) $M_d = 2.750$, $\eta_d = 0.160$, $(\xi < \xi_I)$

ξ	x	y	M
-.0150	-.0147312	.160015[illegible]	1.0147
-.0200	-.0196018	.1600278	1.0095
-.0250	-.0244724	.1600484	
-.0300	-.0293430	.1600770	
-.0350	-.0342135	.1601136	
-.0400	.0390840	.1601582	.9870
-.0450	-.0439544	.1602107	
-.0500	-.0488246	.1602712	
-.0600	-.0585648	.1604160	.9649
-.0700	-.0683044	.1605926	
-.0800	-.0780431	.1608010	.9432
-.0900	-.0877809	.1610411	
-.1000	-.0975176	.1613129	.9218
-.1100	-.1072529	.1616163	
-.1200	-.1169869	.1619513	.9008
-.1300	-.1267193	.1623179	
-.1400	-.1364494	.1627160	.8801
-.1500	-.1461787	.1631456	
-.1600	-.1559054	.1636066	.8598
-.1700	-.1656299	.1640991	
-.1800	-.1753520	.1646229	
-.1900	-.1850717	.1651781	
-.2000	-.1947887	.1657646	.8207
-.2100	-.2045028	.1663823	
-.2200	-.2142140	.1670313	
-.2300	-.2239221	.1677114	
-.2400	-.2336270	.1684227	.7824
-.2500	-.2433284	.1691651	
-.2600	-.2530262	.1699386	
-.2700	-.2627204	.1707431	
-.2800	-.2724107	.1715787	.7460
-.2900	-.2820969	.1724452	
-.3000	-.2917790	.1733425	
-.3100	-.3014569	.1742708	
-.3200	-.3111302	.1752299	.7111
-.3300	-.3207990	.1762198	
-.3400	-.3304630	.1772404	
-.3500	-.3401222	.1782918	
-.3600	-.3497763	.179[illegible]738	.6776
-.3700	-.3594252	.1804664	
-.3800	-.3690688	.1816296	
-.3900	-.3787069	.1828735	
-.4000	-.3883394	.1840075	.6458
-.4100	-.3979662	.1852422	
-.4200	-.4075871	.1865073	
-.4300	-.4172019	.1878027	
-.4400	-.4268106	.1891284	.6153
-.4500	-.4364129	.1904844	
-.4600	-.4460087	.1918705	

Table 1 (Continued)

(e) $M_d = 2.750$, $\eta_d = 0.160$, $(\xi < \xi_I)$

ξ	x	y	M
-.4700	-.4555980	.1932869	
-.4800	-.4651805	.1947334	.5864
-.4900	-.4747562	.1962099	
-.5000	-.4843248	.1977164	
-.5100	-.4938862	.1992529	
-.5200	-.5034403	.2008193	.5589
-.5300	-.5129871	.2024156	
-.5400	-.5225262	.2040416	
-.5500	-.5320576	.2056974	
-.5600	-.5415812	.2073829	.5327
-.5700	-.5510967	.2090981	
-.5800	-.5606042	.2108428	
-.5900	-.5701034	.2126171	
-.6000	-.5795942	.2144208	.5079
-.6100	-.5890765	.2162539	
-.6200	-.5985502	.2181164	
-.6300	-.6080150	.2200082	
-.6400	-.6174709	.2219293	.4844
-.6500	-.6269178	.2238795	
-.6600	-.6363555	.2258589	
-.6700	-.6457838	.2278673	
-.6800	-.6552028	.2299047	.4621
-.6900	-.6646121	.2319710	
-.7000	-.6740117	.2340662	
-.7100	-.6834015	.2361902	
-.7200	-.6927814	.2383430	.4410
-.7300	-.7021511	.2405244	
-.7400	-.7115107	.2427345	
-.7500	-.7208598	.2449731	
-.7600	-.7301986	.2472402	.4210
-.7700	-.7395267	.2495357	
-.7800	-.7488441	.2518595	
-.7900	-.7581507	.2542116	
-.8000	-.7674463	.2565920	.4021
-.8100	-.7767308	.2590004	
-.8200	-.7860041	.2614370	
-.8300	-.7952661	.2639015	
-.8400	-.8045166	.2663939	.3843
-.8500	-.8137556	.2689142	
-.8600	-.8229828	.2714623	
-.8700	-.8321983	.2740381	
-.8800	-.8414018	.2766115	.3674
-.8900	-.8505933	.2792725	
-.9000	-.8597726	.2819309	
-.9100	-.8689397	.2846183	
-.9200	-.8780943	.2873299	.3514
-.9300	-.8872365	.2900704	
-.9400	-.8963860	.2928380	
-.9500	-.9054828	.2956326	

Table 1 (Continued)

(e) $M_d = 2.750$, $\eta_d = 0.160$, $(\xi < \xi_I)$

ξ	x	y	M
-.9600	-.9145868	.2984544	.3363
-.9700	-.9236778	.3013030	
-.9800	-.9327558	.3041785	
-.9900	-.9418205	.3070808	

Table 1 (Continued)

(e) $M_d = 2.750,\ \eta_d = 0.160,\ (\xi < \xi_I)$

ξ	x	y	M
.0000	-.0001197	.1600252	1.0316
.0125	.0120561	.1600886	1.0465
.0150	.0144912	.1601073	1.0494
.0175	.0169262	.1601280	1.0523
.0200	.0193612	.1601507	1.0552
.0250	.0242311	.1602021	1.0610
.0300	.0291008	.1602616	1.0669
.0350	.0339703	.1603291	1.0727
.0400	.0388395	.1604046	1.0786
.0450	.0437085	.1604882	1.0845
.0500	.0485773	.1605799	1.0904
.0550	.0534457	.1606796	
.0600	.0583139	.1607874	1.1023
.0650	.0631817	.1609032	
.0700	.0680492	.1610271	1.1143
.0750	.0729163	.1611591	
.0800	.0777830	.1612992	1.1263
.0850	.0826493	.1614474	
.0900	.0875152	.1616037	1.1385
.0950	.0923806	.1617681	
.1000	.0972456	.1619406	1.1507
.1050	.1021100	.1621213	
.1100	.1069740	.1623100	1.1629
.1150	.1118374	.1625069	
.1200	.1167002	.1627120	1.1753
.1250	.1215624	.1629251	
.1300	.1264241	.1631465	1.1877
.1350	.1312851	.1633759	
.1400	.1361455	.1636136	1.2001
.1450	.1410052	.1638594	
.1500	.1458642	.1641134	1.2127
.1550	.1507225	.1643756	
.1600	.1555800	.1646460	1.2253
.1650	.1604368	.1649246	
.1700	.1652929	.1652114	1.2380
.1750	.1701481	.1655064	
.1800	.1750025	.1658096	1.2507
.1850	.1798560	.1661211	
.1900	.1847087	.1664408	1.2636
.1950	.1895605	.1667688	
.2000	.1944113	.1671050	1.2764
.2050	.1992613	.1674494	
.2100	.2041102	.1678022	1.2894
.2150	.2089582	.1681632	
.2200	.2138052	.1685323	1.3024
.2250	.2186511	.1689102	
.2300	.2234960	.1692961	1.3155
.2350	.2283398	.1696903	
.2400	.2331825	.1700929	1.3286

Table 1 (Continued)

(e) $M_d = 2.750$, $\eta_d = 0.160$, $(\xi < \xi_I)$

ξ	x	y	M
.2450	.2380241	.1705038	
.2500	.2428645	.1709231	1.3418
.2550	.2477038	.1713507	
.2600	.2525419	.1717866	1.3550
.2650	.2573787	.1722310	
.2700	.2622143	.1726837	1.3683
.2750	.2670486	.1731449	
.2800	.2718817	.1736144	1.3817
.2850	.2767134	.1740924	
.2900	.2815438	.1745788	1.3951
.2950	.2863728	.1750736	
.3000	.2912004	.1755769	1.4086
.3050	.2960266	.1760886	
.3100	.3008513	.1766089	1.4222
.3150	.3056746	.1771376	
.3200	.3104964	.1776748	1.4358
.3250	.3153167	.1782205	
.3300	.3201354	.1787748	1.4494
.3350	.3249526	.1793376	
.3400	.3297682	.1799090	1.4632
.3450	.3345821	.1804889	
.3500	.3393944	.1810774	1.4769
.3550	.3442050	.1816745	
.3600	.3490140	.1822802	1.4908
.3650	.3538211	.1828945	
.3700	.3586266	.1835175	1.5047
.3750	.3634302	.1841491	
.3800	.3682321	.1847894	1.5186
.3850	.3730321	.1854384	
.3900	.3778303	.1860961	1.5326
.3950	3826265	.1867625	
.4000	.3874208	.1874377	1.5467
.4050	.3922132	.1881216	
.4100	.3970037	.1888142	1.5608
.4150	.4017921	.1895157	
.4200	.4065784	.1902260	1.5750
.4250	.4113628	.1909450	
.4300	.4161450	.1916730	1.5892
.4350	.4209251	.1924098	
.4400	.4257031	.1931355	1.6035
.4450	.4304788	.1939100	
.4500	.4352521	.1946735	1.6178
.4550	.4400238	.1954160	
.4600	.4447928	.1962274	1.6323
.4650	.4495596	.1970178	
.4700	.4543241	.1978172	1.6467
.4750	.4590861	.1986257	
.4800	.4638458	.1994432	1.6612
.4850	.4686031	.2002697	

Table 1 (Continued)

(e) $M_d = 2.750$, $\eta_d = 0.160$, $(\xi < \xi_I)$

ξ	x	y	M
.4900	.4733579	.2011054	1.6758
.4950	.4781103	.2019502	
.5000	.4828601	.2028042	1.6905
.5050	.4876074	.2036673	
.5100	.4923521	.2045396	1.7052
.5150	.4970941	.2054211	
.5200	.5018336	.2063119	1.7221
.5250	.5065703	.2072120	
.5300	.5113044	.2081214	1.7348
.5350	.5160357	.2090401	
.5400	.5207642	.2099682	1.7498
.5450	.5254899	.2109057	
.5500	.5302127	.2118526	1.7648
.5550	.5349327	.2128090	
.5600	.5396497	.2137748	1.7798
.5650	.5443638	.2147502	
.5700	.5490750	.2157351	1.7949
.5750	.5537830	.2167296	
.5800	.5584881	.2177337	1.8101
.5850	.5631900	.2187474	
.5900	.5678888	.2197709	1.8254
.5950	.5725844	.2208040	
.6000	.5772768	.2218469	1.8408
.6050	.5819660	.2228996	
.6100	.5866519	.2239622	1.8562
.6150	.5913344	.2250345	
.6200	.5960136	.2261168	1.8717
.6250	.6006894	.2272091	
.6300	.6053618	.2283113	1.8873
.6350	.6100307	.2[illegible]4236	
.6400	.6146961	.2305459	1.9030
.6450	.6193579	.2316783	
.6500	.6240161	.2328209	1.9188
.6550	.6286707	.2339737	
.6600	.6333216	.2351367	1.9347
.6650	.6379687	.2363101	
.6700	.6426121	.2374937	1.9507
.6750	.6472517	.2386878	
.6800	.6518875	.2398922	1.9668
.6850	.6565194	.2411[illegible]	
.6900	.6611473	.2423327	1.9829
.6950	.6657712	.2435688	
.7000	.6703911	.2498155	1.9992
.7050	.6750070	.2460729	
.7100	.6796187	.2473410	2.0156
.7150	.6842263	.2486199	
.7200	.6888297	.2499097	2.0322
.7244327*	.6929071	.2510624	

*Inflection point for M = 2.750 nozzle.

Table 1 (Continued)

(e) $M_d = 2.750$, $\eta_d = 0.160$, $(\xi > \xi_I)$

ξ	x	y	M
ξ_d = 1.5289400	2.896972	.5340256	2.7500
1.5250	2.881258	.5340112	2.7462
1.5200	2.861413	.5339684	2.7414
1.5150	2.841678	.5338879	2.7366
1.5100	2.822053	.5337722	2.7318
1.5050	2.802534	.5336228	
1.5000	2.783122	.5334391	2.7222
1.4950	2.763816	.5332220	
1.4900	2.744614	.5329715	
1.4850	2.725517	.5326887	2.7079
1.4800	2.706522	.5323730	2.7032
1.4750	2.687630	.5320251	
1.4700	2.668838	.5316453	
1.4650	2.650147	.5312342	
1.4600	2.631555	.5307922	2.6843
1.4550	2.613062	.5303193	
1.4500	2.594668	.5298158	
1.4450	2.576370	.5292823	
1.4400	2.558168	.5287185	2.6655
1.4350	2.540063	.5281255	2.6608
1.4300	2.522052	.5275032	
1.4250	2.504135	.5268520	
1.4200	2.486310	.5261721	2.6468
1.4150	2.468580	.5254638	
1.4100	2.450941	.5247276	2.6375
1.4050	2.433393	.5239635	
1.4000	2.415936	.5231718	2.6282
1.3950	2.398568	.5223530	
1.3900	2.3812904	.5215072	
1.3850	2.3641010	.5206346	2.6144
1.3800	2.3469992	.5197358	2.6098
1.3750	2.3299850	.5188109	
1.3700	2.3130570	.5178598	
1.3650	2.2962151	.5168832	
1.3550	2.2627871	.5148541	
1.3600	2.2794586	.5158813	2.5914
1.3500	2.2461994	.5138023	
1.3450	2.2296956	.5127255	
1.3400	2.2132747	.5116247	2.5732
1.3350	2.1969363	.51[illegible]93	2.5686
1.3300	2.1806796	.5093501	
1.3250	2.1645044	.5081/74	
1.3200	2.1484056	.506[illegible]811	2.5550
1.3150	2.1323952	.5057615	
1.3100	2.1164605	.5045190	2.5460
1.3050	2.1006048	.5032516	
1.3000	2.0848276	.5019655	2.5369
1.2950	2.0691287	.5006552	
1.2900	2.0535072	.4993227	

Table 1 (Continued)

(e) $M_d = 2.750$, $\eta_d = 0.160$, $(\xi > \xi_I)$

ξ	x	y	M
1.2850	2.0379628	.4979683	2.5235
1.2800	2.0224948	.4965920	2.5190
1.2750	2.0071029	.4951944	
1.2700	1.9917865	.4937753	
1.2650	1.9765452	.4923351	
1.2600	1.9613784	.4908740	2.5011
1.2550	1.9462856	.4893922	
1.2500	1.9312665	.4878898	
1.2450	1.9163206	.4863669	
1.2400	1.9014475	.4848239	2.4833
1.2350	1.8866465	.4832611	2.4789
1.2300	1.8719173	.4816782	
1.2250	1.8572594	.4800759	
1.2200	1.8426723	.4784541	2.4656
1.2150	1.8281559	.4768130	
1.2100	1.8137093	.4751528	2.4568
1.2050	1.7993324	.4734738	
1.2000	1.7850247	.4717760	2.4480
1.1950	1.7707856	.4700595	
1.1900	1.7566150	.4683249	
1.1850	1.7425124	.4665719	2.4348
1.1800	1.7284774	.4648009	2.4314
1.1750	1.7145095	.4630119	
1.1700	1.7006082	.4612053	
1.1650	1.6867735	.4593811	
1.1600	1.6730047	.4575395	2.4130
1.1550	1.6593015	.4556808	
1.1500	1.6456635	.4538049	
1.1450	1.6320903	.4519122	
1.1400	1.6185817	.4500025	2.3956
1.1350	1.6051372	.4480765	2.3912
1.1300	1.5917565	.4461340	
1.1250	1.5784392	.4441751	
1.1200	1.5651850	.4422003	2.3782
1.1150	1.5519935	.4402094	
1.1100	1.5388644	.4382028	2.3696
1.1050	1.5257974	.4361806	
1.1000	1.5127921	.4341428	2.3609
1.0950	1.4998482	.4320395	
1.0900	1.4869655	.4300216	
1.0850	1.4741435	.4279334	
1.0800	1.4613822	.4258399	2.3437
1.0750	1.4486805	.4237276	
1.0700	1.4360384	.4216011	
1.0650	1.4234566	.4194591	
1.0600	1.4109337	.4173033	2.3266
1.0550	1.3984697	.4151338	
1.0500	1.3860640	.4129507	
1.0450	1.3737169	.4107537	

Table 1 (Continued)

(e) $M_d = 2.750$, $\eta_d = 0.160$, $(\xi > \xi_I)$

ξ	x	y	M
1.0400	1.3614284	.4085424	2.3094
1.0350	1.3491971	.4063186	
1.0300	1.3370233	.4040816	
1.0250	1.3249068	.4018315	
1.0200	1.3128475	.3995684	2.2924
1.0150	1.3008444	.3972931	
1.0100	1.2888983	.3950049	
1.0050	1.2770080	.3927048	
1.0000	1.2651739	.3903922	2.2753
.9950	1.2533952	.3880682	
.9900	1.2416721	.3857321	
.9850	1.2300039	.3833851	
.9800	1.2183912	.3810259	2.2583
.9750	1.2068325	.3786562	
.9700	1.1953286	.3762753	
.9650	1.1838790	.3738838	
.9600	1.1724833	.3714817	2 2413
.9550	1.1611412	.3690696	
.9500	1.1498528	.3666471	
.9450	1.1386175	.3642151	
.9400	1.1274353	.3617734	2.2243
.9350	1.1163063	.3593218	
.9300	1.1052300	.3568610	
.9250	1.0942058	.3543916	
.9200	1.0832342	.3519132	2.2073
.9150	1.0723142	.3494266	
.9100	1.0614457	.3469323	
.9050	1.0506290	.3444289	
.9000	1.0398636	.3419172	2.1903
.8950	1.0291507	.3393997	
.8900	1.0184882	.3368738	
.8850	1.0078759	.3343414	
.8800	.9973146	.3318018	2.1733
.8750	.9868033	.3292563	
.8700	.9763434	.3267031	
.8650	.9659316	.3241464	
.8600	.9555706	.3215839	2.1562
.8550	.9452592	.3190137	
.8500	.9349971	.3164398	
.8450	.9247843	.3138607	
.8400	.9146205	.3112776	2.1391
.8350	.9045056	.3086901	
.8300	.8944392	.3060987	
.8250	.8844214	.3035038	
.8200	.8744518	.3009054	2.1220
.8150	.8645302	.2983043	
.8100	.8546566	.2957005	
.8050	.8448307	.2930942	
.8000	.8350522	.2904860	2.1049

Table 1 (Continued)

(e) $M_d = 2.750$, $\eta_d = 0.160$, $(\xi > \xi_I)$

ξ	x	y	M
.7950	.8253209	.2878763	
.7900	.8156367	.2852652	
.7850	.8059997	.2826529	
.7800	.7964091	.2800401	2.0877
.7750	.7868651	.2774270	
.7700	.7773672	.2748140	
.7650	.7679157	.2722013	
.7600	.7585098	.2695893	2.0704
.7550	.7491499	.2669785	
.7500	.7398353	.2643691	
.7450	.7305659	.2617616	
.7400	.7213416	.2591563	2.0530
.7350	.7121622	.2565535	
.7300	.7030274	.2539536	
.7250	.6939371	.2513571	

Table 1 (Continued)

(f) $M_d = 3.000$, $\eta_d = 0.150$, $(\xi > \xi_I)$*

ξ	x	y	M
ξ_d = 1.79849	3.59506	.63518	3.0000
1.7900	3.55856	.63515	2.9924
1.7800	3.51594	.63499	2.9836
1.7700	3.47375	.63468	2.9747
1.7600	3.43196	.63427	2.9658
1.7500	3.39061	.63371	2.9570
1.7400	3.34964	.63304	2.9482
1.7300	3.30904	.63227	2.9395
1.7200	3.26882	.63141	2.9307
1.7100	3.22900	.63038	2.9220
1.7000	3.18956	.62930	2.9132
1.6900	3.15047	.62805	2.9045
1.6800	3.11176	.62672	2.8958
1.6700	3.07338	.62529	2.8872
1.6600	3.03537	.62375	2.8785
1.6500	2.99767	.62211	2.8699
1.6400	2.96039	.62035	2.8613
1.6300	2.92343	.61850	2.8527
1.6200	2.88675	.61657	2.8441
1.6100	2.85043	.61451	2.8355
1.6000	2.81443	.61240	2.8269
1.5900	2.77873	.61017	2.8183
1.5800	2.74335	.60784	2.8097
1.5700	2.70827	.60543	2.8012
1.5600	2.67352	.60293	2.7927
1.5500	2.63906	.60033	2.7842
1.5400	2.60490	.59766	2.7756
1.5300	2.57106	.59489	2.7671
1.5200	2.53747	.59200	2.7586
1.5100	2.50421	.58909	2.7501
1.5000	2.47121	.58605	2.7416
1.4900	2.43850	.58296	2.7331
1.4800	2.40606	.57976	2.7245
1.4700	2.37385	.57648	2.7161
1.4600	2.34197	.57315	2.7076
1.4500	2.31034	.56972	2.6990
1.4400	2.27896	.56621	2.6905
1.4300	2.24788	.56265	2.6820
1.4200	2.21703	.55899	2.6735
1.4100	2.18645	.55526	2.6650
1.4000	2.15613	.551[illegible]7	2.6565
1.3900	2.12605	.54761	2.6479
1.3800	2.09624	.54365	2.6394
1.3700	2.06668	.53963	2.6309
1.3600	2.03736	.53555	2.6223
1.3500	2.00829	.53141	2.6138
1.3400	1.97945	.52719	2.6052
1.3300	1.95086	.52291	2.5966
1.3200	1.92251	.51858	2.5881

*See Table 1 (a) for coordinates upstream of inflection point.

Table 1 (Continued)

(f) $M_d = 3.000$, $\eta_d = 0.150$, $(\xi > \xi_I)$

ξ	x	y	M
1.3100	1.89441	.51416	2.5794
1.3000	1.86653	.50970	2.5708
1.2900	1.83888	.50519	2.5622
1.2800	1.81147	.50061	2.5536
1.2700	1.78431	.49597	2.5449
1.2600	1.75735	.49126	2.5362
1.2500	1.73064	.48653	2.5275
1.2400	1.70416	.48171	2.5189
1.2300	1.67790	.47686	2.5101
1.2200	1.65187	.47193	2.5014
1.2100	1.62604	.46700	2.4926
1.2000	1.60046	.46199	2.4839
1.1900	1.57509	.45696	2.4751
1.1800	1.54995	.45187	2.4663
1.1700	1.52503	.44674	2.4574
1.1600	1.50032	.44157	2.4486
1.1500	1.47584	.43637	2.4397
1.1400	1.45158	.43112	2.4308
1.1300	1.42751	.42584	2.4219
1.1200	1.40367	.42052	2.4129
1.1100	1.38006	.41518	2.4039
1.1000	1.35663	.40980	2.3949
1.0900	1.33336	.40439	2.3858
1.0800	1.31036	.39906	2.3768
1.0700	1.28764	.39352	2.3677
1.0600	1.26507	.38804	2.3586
1.0500	1.24270	.38255	2.3494
1.0400	1.22053	.37704	2.3403
1.0300	1.19857	.37151	2.3311
1.0200	1.17680	.36597	2.3218
1.0100	1.15526	.36043	2.3126
1.0000	1.13388	.35484	2.3033
.9900	1.11274	.34928	2.2940
.9800	1.09177	.34370	2.2846
.9700	1.07103	.33814	2.2752
.9600	1.05047	.33256	2.2658
.9500	1.03010	.32697	2.2554
.9400	1.00996	.32140	2.2469
.9300	.98998	.31584	2.2374
.9200	.97021	.31029	2.2279
.9100	.95060	.3047[illegible]	2.2183
.9000	.93123	.29920	2.2087
.8900	.91205	.29368	2.1990
.8800	.89304	.28815	2.1894
.8700	.87423	.28271	2.1797
.8600	.85559	.27727	2.1699
.8500	.83714	.27184	2.1601
.8400	.81884	.26642	2.1504
.8300	.80073	.26105	2.1405

Table 1 (Continued)

(g) $M_d = 3.250$, $\eta_d = 0.140$, $(\xi < \xi_I)$

ξ	x	y	M
-.0150	-.0147735	.1400137	1.0074
-.0200	-.0196747	.1400280	1.0018
-.0250	-.0245758	.1400493	.9963
-.0300	-.0299769	.1400775	.9907
-.0350	-.0343780	.1401127	.9852
-.0400	-.0392790	.1401549	9796
-.0450	-.0441799	1402041	.9742
-.0500	-.0490808	.1402602	
-.0600	-.0588821	.1403934	.9578
-.0700	-.0686829	.1405545	
-.0800	-.0784831	.1407434	.9363
-.0900	-.0882824	.1409601	
-.1000	-.0980809	.1412045	.9150
-.1100	-.1078783	.1414767	
-.1200	-.1176746	.1447766	.8943
-.1300	-.1274696	.1421043	
-.1400	-.1372633	.1424596	.8738
-.1500	-.1470555	.1428425	
-.1600	-.1568460	.1432531	.8537
-.1700	-.1666348	.1436913	
-.1800	-.1764218	.1441571	
-.1900	-.1862068	.1446504	
-.2000	-.1959897	.1451712	.8145
-.2100	-.2057704	.1457195	
-.2200	-.2155488	.1462954	
-.2300	-.2253248	.1468986	
-.2400	-.2350982	.1475293	.7768
-.2500	-.2448690	.1481874	
-.2600	-.2596370	.1488728	
-.2700	-.2644021	.1495856	
-.2800	-.2741642	.1503258	.7406
-.2900	-.2839231	.1510932	
-.3000	-.2936789	.1518879	
-.3100	-.3034313	.1527098	
-.3200	-.3131802	.1535589	.7059
-.3300	-.3229255	.1544352	
-.3400	-.3326672	.1553386	
-.3500	-.3424050	.1562692	
-.3600	-.3521390	.1572269	.6726
-.3700	-.3618689	.158[illegible]16	
-.3800	-.3715946	.1592274	
-.3900	-.3813161	.1602622	
-.4000	-.3910333	.1613280	.6409
-.4100	-.4007460	.1624207	
-.4200	-.4104541	.1635403	
-.4300	-.4201574	.1646863	
-.4400	-.4298560	.1658602	.6106
-.4500	-.4395497	.1670603	
-.4600	-.4492383	.1682873	

Table 1 (Continued)

(g) $M_d = 3.250,\ \eta_d = 0.140,\ (\xi < \xi_I)$

ξ	x	y	M
-.4700	-.4589218	.1695410	
-.4800	-.4686001	.1708215	.5818
-.4900	-.4782729	.1721286	
-.5000	-.4879404	.1734623	
-.5100	-.4976022	.1748227	
-.5200	-.5072584	.1762097	.5544
-.5300	-.5169087	.1776232	
-.5400	-.5265532	.1790632	
-.5500	-.5361916	.1805297	
-.5600	-.5458240	.1820227	.5283
-.5700	-.5554501	.1835420	
-.5800	-.5650699	.1850877	
-.5900	-.5746832	.1866597	
-.6000	-.5842900	.1882580	.5036
-.6100	-.5938902	.1898826	
-.6200	-.6034836	.1915333	
-.6300	-.6130701	.1932102	
-.6400	-.6226496	.1949133	.4801
-.6500	-.6322221	.1966424	
-.6600	-.6417875	.1983976	
-.6700	-.6513455	.2001787	
-.6800	-.6608961	.2019859	.4579
-.6900	-.6704393	.2043502	
-.7000	-.6799749	.2056778	
-.7100	-.6895028	.2075626	
-.7200	-.6990228	.2094731	.4369
-.7300	-.7085350	.2114093	
-.7400	-.7180392	.2133713	
-.7500	-.7275353	.2153589	
-.7600	-.7370231	.2173721	.4170
-.7700	-.7465027	.2194109	
-.7800	-.7559739	.2214751	
-.7900	-.7654765	.2235648	
-.8000	-.7748906	.2256800	.3981
-.8100	-.7843360	.2278205	
-.8200	-.7937725	2299863	
-.8300	-.8032001	.2321774	
-.8400	-.8126188	.2343937	.3803
-.8500	-.8220283	.2366351	
-.8600	-.8314287	.2389017	
-.8700	-.8408198	.2411933	
-.8800	-.8502014	.2435100	.3635
-.8900	-.8595736	.2458316	
-.9000	-.8689362	.2482181	
-.9100	-.8782892	.2506094	
-.9200	-.8876323	.2530255	.3475
-.9300	-.8969656	.2554665	
-.9400	-.9062889	.2579321	
-.9500	-.9156072	.2604224	

Table 1 (Continued)

(g) $M_d = 3.250$, $\eta_d = 0.140$, $(\xi < \xi_I)$

ξ	x	y	M
-.9600	-.9249054	.2629372	.3325
-.9700	-.9341983	.2654765	
-.9800	-.9434808	.2680403	
-.9900	-.9527530	.2706286	

Table 1 (Continued)

(g) $M_d = 3.250$, $\eta_d = 0.140$, $(\xi < \xi_I)$

ξ	x	y	M
.0000	-.0000701	.1400129	
.0125	.0121824	.1400604	1.0386
.0150	.0146328	.1400751	1.0414
.0175	.0170833	.1400916	1.0443
.0200	.0195337	.1401098	1.0472
.0250	.0244344	.1401516	1.0529
.0300	.0293350	.1402004	1.0587
.0350	.0342354	.1402562	1.0645
.0400	.0391357	.1403190	1.0703
.0450	.0440358	.1403889	1.0761
.0500	.0489358	.1404658	1.0820
.0550	.0538355	.1405497	
.0600	.0587350	.1406407	1.0937
.0650	.0636343	.1407387	
.0700	.0685333	.1408438	1.1055
.0750	.0734321	.1409559	
.0800	.0783306	.1410751	1.1174
.0850	.0332288	.1412013	
.0900	.0881267	.1413346	1.1293
.0950	.0930242	.1414750	
.1000	.0979214	.1416224	1.1414
.1050	.1028183	.1417769	
.1100	.1077148	.1419385	1.1535
.1150	.1126109	.1421072	
.1200	.1175065	.1422830	1.1656
.1250	.1224018	.1424658	
.1300	.1272966	.1426558	1.1778
.1350	.1321909	.1428529	
.1400	.1370848	.1430570	1.1901
.1450	.1419782	.1432683	
.1500	.1468711	.1434867	1.2024
.1550	.1517635	.1437122	
1600	.1566553	.1439448	1.2149
.1650	.1615466	.1441846	
.1700	.1664373	.1444315	1.2273
.1750	.1713274	.1446855	
.1800	.1762169	.1449467	1.2399
.1850	.1811058	.1452150	
.1900	.1859940	.14549[illegible]5	1.2524
.1950	.1908816	.1457732	
.2000	.1957685	.1460630	1.2651
.2050	.2006548	.1463599	
.2100	.2055403	.1466641	1 2778
.2150	.2104251	.1469754	
.2200	.2153092	.1472939	1.2905
.2250	.2201925	.1476196	
.2300	.2250750	.1479523	1.3033
.2350	.2299568	.1482926	
.2400	.2348[illegible]77	.1486400	1.3162

Table 1 (Continued)

(g) M_d = 3.250, η_d = 0.140, ($\xi < \xi_I$)

ξ	x	y	M
.2450	.2397178	.1489945	
.2500	.2445971	.1493562	1.3291
.2550	.2494755	.1497252	
.2600	.2543531	.1501014	1.3421
.2650	.2592297	.1504849	
.2700	.2641054	.1508756	1.3551
.2750	.2689802	.1512736	
.2800	.2738541	.1516788	1.3681
.2850	.2787270	.1520913	
.2900	.2835989	.1525110	1.3812
.2950	.2884698	.1529381	
.3000	.2933397	.1533724	1.3944
.3050	.2982085	.1538141	
.3100	.3030763	.1542630	1.4076
.3150	.3079430	.1547192	
.3200	.3128081	.1551828	1.4209
.3250	.3176732	.1556537	
.3300	.3225366	.1561320	1.4342
.3350	.3273988	.1566175	
.3400	.3322599	.1571105	1.4475
.3450	.3371197	.1576108	
.3500	.3419784	.1581184	1.4609
.3550	.3468359	.1586335	
.3600	.3516921	.1591559	1.4743
.3650	.3565471	.1596858	
.3700	.3614007	.1602230	1.4878
.3750	.3662531	.1607677	
.3800	.3711042	.1613197	1.5013
.3850	.3759539	.1618793	
.3900	.3808023	.1624462	1.5149
.3950	.3856492	.1630206	
.4000	.3904448	.1636025	1.5285
.4050	.3953390	.1641919	
.4100	.4001817	.1647888	1.5421
.4150	.4050230	.1653931	
.4200	.4098628	.1660050	1.5553
.4250	.4147011	.1666244	
.4300	.4195379	.1672513	1.569[illegible]
.4350	.4243731	.1678858	
.4400	.4292068	.1685278	1.5833
.4450	.4340389	.169[illegible]774	
.4500	.4388694	.1698346	1.5971
.4550	.4436983	.1704994	
.4600	.4485256	.1711718	1.6109
.4650	.4533512	.1718518	
.4700	.4581750	.1725395	1.6243
.4750	.4629772	.1732348	
.4800	.4678177	.1734377	1.6387
.4850	.4726364	.1746484	

Table 1 (Continued)

(g) $M_d = 3.250$, $\eta_d = 0.140$, $(\xi < \xi_I)$

ξ	x	y	M
.4900	.4774533	.1753667	1.6527
.4950	.4822685	.1760928	
.5000	.4870818	.1768265	1.6667
.5050	.4918933	.1775680	
.5100	.4967029	.1783173	1.6808
.5150	.5015107	.1790743	
.5200	.5063165	.1798391	1.6949
.5250	.5111204	.1806117	
.5300	.5159224	.1813922	1.7090
.5350	.5207224	.1821804	
.5400	.5255203	.1829766	1.7232
.5450	.5303163	.1837806	
.5500	.5351102	.1845925	1.7351
.5550	.5399021	.1854122	
.5600	.5446918	.1862400	1.7516
.5650	.5494795	.1870756	
.5700	.5542650	.1879193	1.7659
.5750	.5590483	.1887709	
.5800	.5638294	.1896305	1.7803
.5850	.5686084	.1904982	
.5900	.5733850	.1913739	1.7947
.5950	.5781595	.1922576	
.6000	.5829316	.1931495	1.8091
.6050	.5877014	.1940494	
.6100	.5924689	.1949575	1.8236
.6150	.5972340	.1958738	
.6200	.6019967	.1967982	1.8382
.6250	.6067570	.1977309	
.6300	.6115148	.1986718	1.8528
.6350	.6162702	.1996209	
.6400	.6210731	.2005783	1.8674
.6450	.6257734	.2015440	
.6500	.6305212	.2025180	1.8821
.6550	.6352664	.2035004	
.6600	.6400090	.2044912	1.8968
.6650	.6447490	.2054904	
.6700	.6494863	.2064980	1.9116
.6750	.6542209	.2075141	
.6800	.6589528	.2085387	1.9265
.6850	.6636819	.2095[illegible]18	
.6900	.6684083	.2106175	1.9414
6950	.6731318	.2116637	
.7000	.6778525	.2127226	1.9564
.7050	.6825704	.2137901	
.7100	.6872853	.2148663	1.9714
.7150	.6919974	.2159512	
.7200	.6967064	.2170449	1.9865
.7250	.7014125	.2181473	
.7300	.7061155	.2192585	2.0017

Table 1 (Continued)

(g) $M_d = 3.250$, $\eta_d = 0.140$, $(\xi < \xi_I)$

ξ	x	y	M
.7350	.7108155	.2203766	
.7400	.7155125	.2215076	2.0170
.7450	.7202063	.2226455	
.7500	.7248969	.2237924	2.0323
.7550	.7295844	.2249482	
.7600	.7342687	.2261131	2.0477
.7650	.7389497	.2272871	
.7700	.7436275	.2284701	2.0632
.7750	.7483019	.2296624	
.7800	.7529730	.2308638	2.0787
.7850	.7576407	.2320744	
.7900	.7623051	.2332943	2.0943
.7950	.7669659	.2345236	
.8000	.7716233	.2357622	2.1100
.8050	.7762772	.2370102	
.8100	.7809275	.2382677	2.1258
.8150	.7855743	.2395347	
.8200	.7902174	.2408112	2.1417
.8250	.7948569	.2420973	
.8300	.7994926	.2433931	2.1577
.8350	.8041247	.2446985	
.8400	.8087530	.2460137	2.1738
.8450	.8133774	.2473387	
.8500	.8179981	.2486735	2.1900
.8550	.8226148	.2500183	
.8600	.8272276	.2513729	2.2062
.8650	.8318365	.2527376	
.8700	.8364414	2541124	2.2227
.8750	.8410422	.2554973	
.8800	.8456390	.2568923	2.2392
.8850	.8502316	.2582976	
.8900	.8548201	.2597132	2.2558
.8950	.8594044	.2611391	
.9000	.8639845	.2625755	2.2726
.9095678*	.8727367	.2653534	

*Inflection point for M = 3.250 nozzle.

Table 1 (Continued)

(g) $M_d = 3.250$, $\pi_d = 0.140$, $(\xi > \xi_I)$

	ξ	x	y	M
$\xi_d =$	2.0902377	4.414659	.7516726	3.2500
	2.0900	4.413554	.7516707	3.2498
	2.0850	4.390361	.7516567	3.2457
	2.0800	4.367270	.7516144	3.2416
	2.0750	4.344284	.7515366	3.2375
	2.0700	4.321395	.7514391	3.2334
	2.0650	4.298609	.7513062	3.2293
	2.0600	4.275923	.7511460	3.2252
	2.0550	4.253336	.7509584	3.2211
	2.0500	4.230846	.7507478	3.2170
	2.0450	4.208454	.7505029	3.2129
	2.0400	4.186158	.7502391	3.2088
	2.0350	4.163960	.7499412	3.2048
	2.0300	4.141858	.7496168	3.2007
	2.0250	4.119849	.7492705	3.1966
	2.0200	4.097936	.7488938	3.1926
	2.0150	4.076115	.7484957	3.1885
	2.0100	4.054389	.7480681	3.1844
	2.0050	4.032755	.7476114	3.1804
	2.0000	4.011213	.7471330	3.1763
	1.9950	3.989762	.7466295	3.1723
	1.9900	3.968401	.7461009	3.1683
	1.9850	3.947132	.7455478	3.1642
	1.9800	3.925949	.7449696	3.1602
	1.9750	3.904860	.7443638	3.1561
	1.9700	3.883854	.7437402	3.1521
	1.9650	3.862939	.7430891	3.1481
	1.9600	3.842111	.7424139	3.1441
	1.9550	3.821369	.7417147	3.1401
	1.9500	3.800716	.7409886	3.1360
	1.9450	3.780146	.7402422	3.1320
	1.9400	3.759661	.7394753	3.1280
	1.9350	3.739261	.7386820	3.1240
	1.9300	3.718946	.7378655	3.1200
	1.9250	3.698714	.7370287	3.1160
	1.9200	3.678565	.7361697	3.1120
	1.9150	3.658499	.7352876	3.1080
	1.9100	3.638516	.7343797	3.1040
	1.9050	3.618614	.7334526	3.1000
	1.9000	3.598793	.7325[illegible]30	3.0960
	1.8950	3.579052	.7315341	3.0921
	1.8900	3.559393	.7305400	3.0881
	1.8850	3.539814	.7295242	3.0841
	1.8800	3.520313	.7284893	3.0801
	1.8750	3.500891	.7274328	3.0761
	1.8700	3.481548	.7263576	3.0722
	1.8650	3.462283	.7252580	3.0682
	1.8600	3.443095	.7241401	3.0642
	1.8550	3.423986	.7229981	3.0603

Table 1 (Continued)

(g) $M_d = 3.250$, $\eta_d = 0.140$, $(\xi > \xi_I)$

ξ	x	y	M
1.8500	3.404953	.7218378	3.0563
1.8450	3.385996	.7206567	3.0523
1.8400	3.3[illegible]7115	.7194573	3.0484
1.8350	3.348309	.7182375	3.0444
1.8300	3.329579	.7169970	3.0405
1.8250	3.310921	.7157385	3.0365
1.8200	3.292341	.7144574	3.0326
1.8150	3.273833	.7131610	3.0286
1.8100	3.255398	.7118421	3.0247
1.8050	3.237037	.7105057	3.0207
1.8000	3.218750	.7091470	3.0168
1.7950	3.200532	.7077735	3.0128
1.7900	3.182389	.7063779	3.0089
1.7850	3.164316	.7049678	3.0050
1.7800	3.146314	.7035357	3.0010
1.7750	3.128384	.7020867	2.9971
1.7700	3.110525	.7006164	2.9932
1.7650	3.092734	.6991316	2.9892
1.7600	3.075013	.6976279	2.9853
1.7550	3.057363	.6961054	2.9814
1.7500	3.039781	.6945665	2.9775
1.7450	3.022269	.6930065	2.9735
1.7400	3.004823	.6914328	2.9696
1.7350	2.987448	.6898383	2.9657
1.7300	2.970138	.6882297	2.9618
1.7250	2.952896	.6866011	2.9579
1.7200	2.935722	.6849563	2.9540
1.7150	2.918613	.6832958	2.9500
1.7100	2.901571	.6816174	2.9461
1.7050	2.884596	.6799211	2.9422
1.7000	2.867686	.6782072	2.9383
1.6950	2.850840	.6764800	2.9344
1.6900	2.834061	.6747352	2.9305
1.6850	2.817346	.6729729	2.9266
1.6800	2.800696	.6711935	2.9227
1.6750	2.78411[illegible]	.6693988	2.9188
1.6700	2.7[illegible]	.6675871	2.9149
1.6650	2.751128	.6657621	2.9110
1.6600	2.734731	.6639205	2.9070
1.6550	2.718398	.66[illegible]618	2.9031
1.6500	2.702128	.6601067	2.8992
1.6450	2.6859199	.6582966	
1.6400	2.6697743	.6563902	2.8914
1.6350	2.6536890	.6544710	
1.6300	2.6376667	.6525336	
1.6250	2.6217059	.6505600	
1.6200	2.6058047	.6486138	2.8758
1.6150	2.5899646	.6466317	
1.6100	2.5741853	.6446336	

Table 1 (Continued)

(g) $M_d = 3.250$, $\eta_d = 0.140$, $(\xi > \xi_I)$

ξ	x	y	M
1.6050	2.5584657	.6426214	
1.6000	2.5428054	.6405956	2.8602
1.5950	2.5272052	.6385531	
1.5900	2.5116648	.6364955	
1.5850	2.4961830	.6344243	
1.5800	2.4807595	.6323391	2.8447
1.5750	2.4653950	.6302388	
1.5700	2.4500892	.6281232	
1.5650	2.4348411	.6259941	
1.5600	2.4196511	.6238501	2.8291
1.5550	2.4045181	.6216927	
1.5500	2.3894423	.6195219	
1.5450	2.3744248	.6173350	
1.5400	2.3594627	.6151364	2.8135
1.5350	2.3445577	.6129233	
1.5300	2.3297096	.6106957	
1.5250	2.3149164	.6084567	
1.5200	2.3001801	.6062019	2.7970
1.5150	2.2854994	.6039345	
1.5100	2.2708743	.6016530	
1.5050	2.2563042	.5993589	
1.5000	2.2417895	.5970510	2.7822
1.4950	2.2273293	.5947306	
1.4900	2.2129240	.5923967	
1.4850	2.1985727	.5900503	
1.4800	2.1842760	.5876906	2.7666
1.4750	2.1700336	.5853175	
1.4700	3.1558447	.5829324	
1.4650	2.1417097	.5805341	
1.4600	2.1276277	.5781241	2.7509
1.4550	2.1135993	.5757010	
1.4500	2.0996235	.5732664	
1.4450	2.0857008	.5708189	
1.4400	2.0718304	.5683599	2.7352
1.4350	2.0580128	.5658886	
1.4300	2.0442478	.5634045	
1.4250	2.0305351	.5609084	
1.4200	2.0168748	.5584000	2.7195
1.4150	2.0032650	.5558816	
1.4100	1.9897072	.5533514	
1.4050	1.9762016	.5508081	
1.4000	1.9627464	.5482352	2.7037
1.3950	1.9493437	.5456886	
1.3900	1.9359909	.5431125	
1.3850	1.9226885	.5405260	
1.3800	1.9094382	.5379233	2.6879
1.3750	1.8962373	.5353174	
1.3700	1.8830870	.5326973	
1.3650	1.8690870	.5300663	

Table 1 (Continued)

(g) $M_d = 3.250$, $\eta_d = 0.140$, $(\xi > \xi_I)$

ξ	x	y	M
1.3600	1.8569372	.5274245	2.6720
1.3550	1.8439381	.5247713	
1.3500	1.8309876	.5221093	
1.3450	1.8180870	.5194368	
1.3400	1.8052359	.5167540	2.6561
1.3350	1.7924348	.5140603	
1.3300	1.7796825	.5113574	
1.3250	1.7669795	.5086446	
1.3200	1.7543254	.5059221	2.6401
1.3150	1.7417201	.5031901	
1.3100	1.7291638	.5004484	
1.3050	1.7166559	.4976976	
1.3000	1.7041971	.4949368	2.6241
1.2950	1.6917857	.4921685	
1.2900	1.6794230	.4893906	
1.2850	1.6671085	.4866040	
1.2800	1.6548418	.4838087	2.6079
1.2750	1.6426235	.4810044	
1.2700	1.6304525	.4781925	
1.2650	1.6183296	.4753716	
1.2600	1.6062542	.4725431	2.5917
1.2550	1.5942262	.4697067	
1.2500	1.5822456	.4668627	
1.2450	1.5703124	.4640106	
1.2400	1.5584264	.4611511	2.5754
1.2350	1.5465872	.4582846	
1.2300	1.5347950	.4554111	
1.2250	1.5230498	.4525303	
1.2200	1.5113517	.4496423	2.5590
1.2150	1.4996997	.4467484	
1.2100	1.4880945	.4438477	
1.2050	1.4765360	.4409405	
1.2000	1.4650237	.4380273	2.5426
1.1950	1.4535574	.4351085	
1.1900	1.4421376	.4321836	
1.1850	1.4307645	.4292524	
1.1800	1.4194368	.4263166	2.5260
1.1750	1.4081550	.4233754	
1.1700	1.3969189	.4204294	
1.1650	1.3857288	.4174784	
1.1600	1.3745847	.4143[illegible]2	2.5093
1.1550	1.3634855	.4115673	
1.1500	1.3524322	.4085976	
1.1450	1.3414240	.4056291	
1.1400	1.3304616	.4026563	2.4924
1.1350	1.3195441	.3996801	
1.1300	1.3086716	.3967001	
1.1250	1.2978444	.3937176	
1.1200	1.2870620	.3907316	2.4755

Table 1 (Continued)

(g) $M_d = 3.250$, $\eta_d = 0.140$, $(\xi > \xi_I)$

ξ	x	y	M
1.1150	1.2763243	.3877430	
1.1100	1.2656318	.3847513	
1.1050	1.2549837	.3817574	
1.1000	1.2443802	.3787614	2.4584
1.0950	1.2338212	.3757635	
1.0900	1.2233067	.3727635	
1.0850	1.2128365	.3697621	
1.0800	1.2024105	.3667595	2.4412
1.0750	1.1920287	.3637556	
1.0700	1.1816908	.3607512	
1.0650	1.1713969	.3577460	
1.0600	1.1611470	.3547403	2.4239
1.0550	1.1509409	.3517343	
1.0500	1.1407781	.3487289	
1.0450	1.1306590	.3457236	
1.0400	1.1205837	.3427185	2.4064
1.0350	1.1105514	.3397146	
1.0300	1.1005623	.3367118	
1.0250	1.0906165	.3337102	
1.0200	1.0807138	.3307100	2.3888
1.0150	1.0708540	.3277116	
1.0100	1.0610372	.3247151	
1.0050	1.0512629	.3217212	
1.0000	1.0415313	.3187296	2.3710
.9950	1.0318422	.3157408	
.9900	1.0221954	.3127552	
.9850	1.0125910	.3097727	
.9800	1.0030287	.3067938	2.3531
.9750	.9935084	.3038187	
.9700	.9840301	.3008476	
.9650	.9745936	.2978809	
.9600	.9651987	.2949186	2.3350
.9550	.9558455	.2919613	
.9500	.9465334	.2890090	
.9450	.9372628	.2860620	
.9400	.9280333	.2831206	2.3168
.9350	.9188448	.2801851	
.9300	.9096972	.2772556	
.9250	.9005903	.2743326	
.9200	.8915240	.2714162	2.2984
.9150	.8824982	.26850[illegible]6	
.9100	.8735126	.2656042	

Table 1 (Continued)

(h) $M_d = 3.500$, $\eta_d = 0.130$, $(\xi < \xi_I)$

ξ	x	y	M
-.0150	-.0148167	.1300137	1.0041
-.0200	-.0197116	.1300282	.9985
-.0250	-.0246264	.1300493	.9930
-.0300	-.0295412	.1300769	.9874
-.0350	-.0344560	.1301109	.9819
-.0400	-.0393707	.1301514	.9764
-.0450	-.0442853	.1301984	.9710
-.0500	-.0491999	.1302519	.9655
-.0550	-.0541143	.1303118	.9601
-.0600	-.0590287	.1303783	.9547
-.0650	-.0539429	.1304512	.9493
-.0700	-.0688570	.1305305	.9439
-.0750	-.0737710	.1306163	.9386
-.0800	-.0786848	.1307086	.9332
-.0850	-.0835984	.1308074	.9279
-.0900	-.0885118	.1309126	.9226
-.0950	-.0934250	.1310243	.9174
-.1000	-.0983380	.1311423	.9121
-.1050	-.1032508	.1312669	.9069
-.1100	-.1081634	.1313979	.9017
-.1150	-.1130757	.1315353	.8965
-.1200	-.1179878	.1316792	.8914
-.1250	-.1228995	.1318296	.8862
-.1300	-.1278110	.1319863	.8811
-.1350	-.1327222	.1321495	.8760
-.1400	-.1376330	.1323192	.8710
-.1450	-.1425436	.1324952	.8659
-.1500	-.1474538	.1326777	.8609
-.1550	-.1523636	.1328666	.8559
-.1600	-.1572731	.1330620	.8509
-.1650	-.1621822	.1332637	.8459
-.1700	-.1670909	.1334582	.8410
-.1750	-.1719992	.1336865	.8361
-.1800	-.1769071	.1339075	.8312
-.1850	-.1818146	.1341349	.8263
-.1900	-.1867216	.1343687	.8215
-.1950	-.1916281	.1346089	.8167
-.2000	-.1965342	.1348556	.8119
-.2050	-.2014398	.1351086	.8071
-.2100	-.2063450	.1353580	.8023
-.2150	-.2112496	.1356138	.7976
-.2200	-.2161537	.1359080	.7929
-.2250	-.2210573	.1361846	.7882
-.2300	-.2259604	.1364696	.7835
-.2350	-.2308629	.1367610	.7489
-.2400	-.2357648	.1370587	.7743
-.2450	-.2406661	.1373628	.7697
-.2500	-.2455779	.1376730	.7651
-.2550	-.2504670	.1379902	.7605

Table 1 (Continued)

(h) $M_d = 3.500$, $\eta_d = 0.130$, $(\xi < \xi_I)$

ξ	x	y	M
-.2600	-.2553666	.1383135	.7560
-.2650	-.2602655	.1386431	.7515
-.2700	-.2651637	.1389791	.7470
-.2750	-.2700614	.1393214	.7426
-.2800	-.2749583	.1396701	.7382
-.2850	-.2798546	.1400252	.7337
-.2900	-.2847501	.1403866	.7294
-.2950	-.2896455	.1407544	.7250
-.3000	-.2945392	.1411285	.7207
-.3050	-.2994326	.1415089	.7163
-.3100	-.3043253	.1418957	.7121
-.3150	-.3092172	.1422889	.7078
-.3200	-.3141084	.1426884	.7035
-.3250	-.3189988	.1430942	.6993
-.3300	-.3238884	.1435064	.6951
-.3350	-.3287772	.1439248	.6909
-.3400	-.3336652	.1443496	.6868
-.3450	-.3385524	.1447808	.6826
-.3500	-.3434388	.1452182	.6785
-.3550	-.3483242	.1456620	.6745
-.3600	-.3532089	.1461121	.6704
-.3650	-.3580925	.1465685	.6664
-.3700	-.3629755	.1470342	.6623
-.3750	-.3678574	.1475002	.6583
-.3800	-.3727385	.1479755	.6544
-.3850	-.3776186	.1484572	.6504
-.3900	-.3824978	.1489451	.6465
-.3950	-.3873760	.1494393	.6426
-.4000	-.3922533	.1499398	.6387
.4100	-.4020050	.1509997	.6310
-.4200	-.4117526	.1520047	.6234
-.4300	-.4214962	.1530748	.6151
-.4400	-.4312356	.1541699	.6085
-.4500	-.4409708	.1552901	.6012
-.4600	-.4507015	.1564354	.5940
-.4700	-.4604278	.1576056	.5868
-.4800	-.4701496	.1599008	.5797
-.4900	-.4798669	.1600210	.5728
-.5000	-.4895790	.1612660	5659
-.5100	-.4992865	.1625[illegible]	.5591
-.5200	-.5089891	.1628308	.5524
-.5300	-.5186866	.1651504	.5457
-.5400	-.5283790	.1664949	.5392
-.5500	-.5380662	.1678641	.5327
-.5600	.5477480	.1692328	.5264
-.5700	-.5574245	.1706767	.5199
-.5800	-.5670954	.1721200	.5139
-.5900	-.5767608	.1735881	.5083
-.6000	-.5864205	.1750806	.5017

Table 1 (Continued)

(h) M_d - 3.500, η_d = 0.130, ($\xi < \xi_I$)

ξ	x	y	M
-.6100	-.5960744	.1765978	.4957
-.6200	-.6057223	.1781396	.4898
-.6300	-.6153644	.1797059	.4840
-.6400	-.6250004	.1812966	.4782
-.6500	-.6346302	.1829118	.4726
-.6600	-.6442538	.1845515	.4670
-.6700	-.6538710	.1862162	.4615
-.6800	-.6634818	.1879039	.4561
-.6900	-.6730861	.1895957	.4507
-.7000	-.6826839	.1913535	.4454
-.7100	-.6922748	.1931148	.4402
-.7200	-.7018590	.1949002	.4350
-.7300	-.7114364	.1967098	.4300
-.7400	-.7210067	.1985436	.4250
-.7500	-.7305700	.2004014	.4200
-.7600	-.7401262	.2022834	.4151
-.7700	-.7496751	.2041893	.4103
-.7800	-.7592167	.2061192	.4056
-.7900	-.7687509	.2080761	.4009
-.8000	-.7782776	.2100509	.3963
-.8100	-.7878967	.2120526	.3918
-.8200	-.7973081	.2140781	.3873
-.8300	-.8068118	.2161274	.3829
-.8400	-.8163076	.2182004	.3785
-.8500	-.8257960	.2202972	.3742
-.8600	-.8352753	.2224176	.3700
-.8700	-.8447470	.2245616	.3658
-.8800	-.8542106	.2267293	.3617
-.8900	-.8636658	.2289205	.3576
-.9000	-.8731127	.2311351	.3536
-.9100	-.8825523	.2333683	.3497
-.9200	-.8919811	.2356345	.3458
-.9300	-.9014024	.2379197	.3419
-.9400	-.9108149	.2402280	.3382
-.9500	-.9202187	.2425595	.3344
-.9600	-.9296137	.2449142	.3307
-.9700	-.9389996	.2472922	.3271
-.9800	-.9483766	.2496932	.3235
-.9900	-.9577444	.2521174	.3200

Table 1 (Continued)

(h) $M_d = 3.500$, $\eta_d = 0.130$ $(\xi < \xi_I)$

ξ	x	y	M
.0000	-.0000521	.1300089	
.0125	.0122348	.1300496	1.0350
.0150	.0146921	.1300627	1.0379
.0175	.0171494	.1300773	1.0407
.0200	.0196067	.1300936	1.0436
.0225	.0220640	.1301115	1.0465
.0250	.0245212	.1031310	1.0493
.0275	.0269785	.1301522	1.0522
.0300	.0294357	.1301750	1.0551
.0325	.0318928	.1301994	1.0579
.0350	.0343500	.1302254	1.0608
.0375	.0368071	.1302532	1.0637
.0400	.0392642	.1302825	1.0666
.0425	.0417212	.1303134	1.0695
.0450	.0441782	.1303460	1.0724
.0475	.0466352	.1303802	1.0753
.0500	.0490920	.1304160	1.0782
.0525	.0515490	.1304535	1.0811
.0550	.0540058	.1304926	1.0840
.0575	.0564626	.1305333	1.0869
.0600	.0589194	.1305757	1.0899
.0625	.0613760	.1306197	1.0928
.0650	.0638327	.1306653	1.0957
.0675	.0662893	.1307126	1.0987
.0700	.0687458	.1307615	1.1016
.0725	.0712023	.1308120	1.1046
.0750	.0736587	.1308642	1.1075
.0775	.0761151	.1309180	1.1105
.0800	.0785714	.1309735	1.1134
.0825	.0810277	.1310306	1.1164
.0850	.0834839	.1310893	1.1194
.0875	.0859400	.1311496	1.1223
.0900	.0883960	.1312116	1.1253
.0925	.0908520	.1312753	1.1283
.0950	.0933079	.1313405	1.1313
.0975	.0957638	.1314075	1.1343
.1000	.0982195	.1314760	1.1373
.1025	.1006752	.1315462	1.1403
.1050	.1031308	.1316180	1.1433
.1075	.1055864	.1316915	1.1463
.1100	.1080418	.1317666	1.1493
.1125	.1104972	.1318[illegible]34	1.1523
.1150	.1129525	.1319[illegible]18	1.1553
.1175	.1154077	.1320018	1.1583
.1200	.1178628	.1320835	1.1613
.1225	.1203178	.1321668	1.1644
.1250	.1227728	.1322518	1.1674
.1275	.1252275	.1323384	1.1704
.1300	.1276823	.1324267	1.1735

Table 1 (Continued)

(h) $M_d = 3.500$, $\eta_d = 0.130$, $(\xi < \xi_I)$

ξ	x	y	M
.1325	.1301370	.1325166	1.1765
.1350	.1325915	.1326081	1.1796
.1375	.1350460	.1327013	1.1826
.1400	.1375003	.1327961	1.1857
.1425	.1399546	.1328926	1.1887
.1450	.1424087	.1329908	1.1894
.1475	.1448628	.1330905	1.1949
.1500	.1473167	.1331920	1.1979
.1525	.1497705	.1332950	1.2010
.1550	.1522242	.1333998	1.2041
.1575	.1546778	.1335060	1.2072
.1600	.1571313	.1336142	1.2102
.1625	.1595847	.1337238	1.2133
.1650	.1620379	.1338352	1.2164
.1675	.1644910	.1339481	1.2195
.1700	.1669440	.1340628	1.2226
.1725	.1693969	.1341790	1.2257
.1750	.1718496	.1342970	1.2288
.1775	.1743023	.1344166	1.2296
.1800	.1767547	.1345378	1.2351
.1825	.1792071	.1346607	1.2069
.1850	.1816593	.1347852	1.2413
.1875	.1841114	.1349114	1.2444
.1900	.1865634	.1350393	1.2475
.1925	.1890152	.1351688	1.2507
.1950	.1914669	.1353000	1.2538
.1975	.1939184	.1354328	1.2569
.2000	.1963698	.1355673	1.2601
.2025	.1988211	.1357035	1.2632
.2050	.2012722	.1358413	1.2664
.2075	.2037231	.1359807	1.2695
.2100	.2061739	.1361218	1.2727
.2125	.2086246	.1362646	1.2758
.2150	.2110750	.1364091	1.2790
.2175	.2135254	.1365552	1.2821
.2200	.2159756	.1367029	1.2853
.2225	.2184256	.1368524	1.2885
.2250	.2208754	.1370035	1.2917
.2275	.2233251	.1371562	1.2948
.2300	.2257747	.1373107	1.2980
.2325	.2282240	.1[illegible]667	1.3012
.2350	.2306732	.1376245	1.3044
.2375	.2331222	.1377844	1.3076
.2400	.2355711	.1379450	1.3108
.2425	.2380198	.1381078	1.3139
.2450	.2404683	.1382722	1.3171
.2475	.2429166	.1384183	1.3203
.2500	.2453647	.1386060	1.3235
.2525	.2478127	.1387754	1.32[illegible]8

Table 1 (Continued)

(h) $M_d = 3.500$, $\eta_d = 0.130$, $(\xi < \xi_I)$

ξ	x	y	M
.2550	.2502605	.1389465	1.3300
.2575	.2527081	.1391193	1.3332
.2600	.2551555	.1392938	1.3364
.2625	.2576027	.1394699	1.3396
.2650	.2600497	.1396477	1.3428
.2675	.2624966	.1398271	1.3460
.2700	.2649432	.1400082	1.3493
.2725	.2673896	.1401911	1.3525
.2750	.2698359	.1403755	1.3557
.2775	.2722819	.1405617	1.3590
.2800	.2747278	.1407495	1.3622
.2825	.2771734	.1409390	1.3654
.2850	.2776188	.1411302	1.3687
.2875	.2820641	.1413231	1.3719
.2900	.2845091	.1415177	1.3752
.2925	.2869539	.1417139	1.3784
.2950	.2893985	.1419118	1.3817
.2975	.2918428	.1421114	1.3850
.3000	.2942870	.1423127	1.3882
.3025	.2967309	.1425156	1.3915
.3050	.2991747	.1427203	1.3947
.3075	.3016181	.1429266	1.3980
.3100	.3040614	.1431346	1.4013
.3125	.3065045	.1433443	1.4045
.3150	.3089473	.1435557	1.4078
.3175	.3113899	.1437688	1.4111
.3200	.3138322	.1439836	1.4144
.3225	.3162743	.1442070	1.4176
.3250	.3187162	.1444181	1.4209
.3275	.3211579	.1446380	1.4242
.3300	.3235993	.1448595	1.4275
.3325	.3260404	.1450827	1.4308
.3350	.3284813	.1453076	1.4341
.3375	.3309220	.1455342	1.4374
.3400	.3333624	.1457625	1.4407
.3425	.3358026	.1459925	1.4440
.3450	.3382425	.1462242	1.4473
.3475	.3406622	.1464576	1.4506
.3500	.3431216	.1466927	1.4539
.3525	.3455607	.1469295	1.4572
.3550	.3479996	.147[illegible]80	1.4605
.3575	.3504383	.1474032	1.4639
.3600	.3528766	.1476501	1.4672
.3625	.3553147	.1478937	1.4705
.3650	.3577526	.1481390	1.4738
.3675	.3601901	.1483860	1.4771
.3700	.3626274	.1486347	1.4805
.3725	.3650645	.1488851	1.4838
.3750	.3675012	.1491372	1.4871

Table 1 (Continued)

(h) $M_d = 3.500$, $\eta_d = 0.130$, $(\xi < \xi_I)$

ξ	x	y	M
.3775	.3699377	.1493910	1.4905
.3800	.3723738	.1496466	1.4938
[illegible]	.3748097	.1499038	1.4971
.3850	.3772454	.1501628	1.5005
.3875	.3796807	.1504235	1.5038
.3900	.3821157	.1506858	1.5072
.3925	.3845505	.1509499	1.5105
.3950	.3869850	.1512158	1.5139
.3975	.3894191	.1514833	1.5172
.4000	.3918530	.1517525	1.5206
.4025	.3942866	.1520235	1.5239
.4050	.3967199	.1522962	1.5273
.4075	.3991528	.1525706	1.5307
.4100	.4015855	.1528467	1.5340
.4125	.4040179	.1531246	1.5374
.4150	.4064499	.1534042	1.5408
.4175	.4088816	.1536855	1.5441
.4200	.4113131	.1539685	1.5475
.4225	.4137442	.1542532	1.5509
.4250	.4161750	.1545397	1.5543
.4275	.4186055	.1548279	1.5576
.4300	.4210356	.1551179	1.5610
.4325	.4234655	.1554095	1.5644
.4350	.4258950	.1557029	1.5678
.4375	.4283241	.1559981	1.5712
.4400	.4307530	.1562949	1.5746
.4425	.4331815	.1565936	1.5780
.4450	.4356096	.1568939	1.5813
.4475	.4380375	.1571960	1.5847
.4500	.4404650	.1574998	1.5881
.4525	.4428922	.1578054	1.5915
.4550	.4453190	.1581127	1.5949
.4575	.44[illegible]7455	.1584217	1.5983
.4600	.4501716	.1587325	1.6018
.4625	.4525974	.1590451	1.6052
.4650	.4550229	.1593594	1.6086
.4675	.4574479	.1596754	1.6120
.4700	.4598727	.1599932	1.6154
.4725	.4622970	.1603127	1.6188
.4750	.4647210	.1606340	1.6222
.4775	.4671447	.16[illegible]9571	1.6257
.4800	.4695679	.16[illegible]2819	1.6291
.4825	.4719908	.1616084	1.6325
.4850	.4744134	.1619368	1.6359
.4875	.4768355	.1622668	1.6394
.4900	.4792573	.1625987	1.6428
.4925	.4816788	.1629323	1.6462
.4950	.4840998	.1632676	1.6497
.4975	.4865204	.1636048	1.6531

Table 1 (Continued)

(h) $M_d = 3.500$, $\eta_d = 0.130$, $(\xi < \xi_I)$

ξ	x	y	M
.5000	.4889407	.1639437	1.6565
.5025	.4913606	.1642843	1.6600
.5050	.4937801	.1646268	1.6634
.5075	.4961992	.1649710	1.6669
.5100	.4986179	.1653169	1.6703
.5125	.5010363	.1656647	1.6738
.5150	.5034542	.1660142	1.6772
.5175	.5058717	.1663655	1.6807
.5200	.5082888	.1667186	1.6841
.5225	.5107056	.1670735	1.6876
.5250	.5131219	.1674301	1.6910
.5275	.5155378	.1677886	1.6945
.5300	.5179533	.1681488	1.6979
.5325	.5203684	.1685108	1.7014
.5350	.5227830	.1688746	1.7049
.5375	.5251973	.1692402	1.7083
.5400	.5276111	.1696076	1.7118
.5425	.5300245	.1699767	1.7153
.5450	.5324375	.1703477	1.7188
.5475	.5348501	.1707205	1.7222
.5500	.5372622	.1710950	1.7257
.5525	.5396739	.1714714	1.7292
.5550	.5420851	.1718495	1.7327
.5575	.5444959	.1722295	1.7362
.5600	.5469063	.1726113	1.7397
.5625	.5493163	.1729950	1.7432
.5650	.5517253	.1733803	1.7466
.5675	.5541348	.1737675	1.7501
.5700	.5565434	.1741565	1.7536
.5725	.5589515	.1745473	1.7571
.5750	.5613592	.1749400	1.7606
.5775	.5637654	.1753345	1.7641
.5800	.5661732	.1757308	1.7676
.5825	.5685795	.1761289	1.7711
.5850	.5709854	.1765288	1.7747
.5875	.5733907	.1769306	1.7782
.5900	.5757956	.1773342	1.7817
.5925	.5782001	.1777396	1.7852
.5950	.5806040	.1781469	1.7887
.5975	.5830075	.1785560	1.7922
.6000	.5854105	.1789669	1.7958
.6025	.5878130	.1793797	1.7993
.6050	.5902151	.1797943	1.8028
.6075	.5926166	.1802108	1.8063
.6100	.5950177	.1806291	1.8099
.6125	.5974182	.1810492	1.8134
.6150	.5998183	.1814713	1.8169
.6175	.6022178	.1818951	1.8205
.6200	.6046169	.1823208	1.8240

Table 1 (Continued)

(h) $M_d = 3.500$, $\eta_d = 0.130$, $(\xi < \xi_I)$

ξ	x	y	M
.6225	.6070155	.1827481	1.8276
.6250	.6094135	.1831778	1.8311
.6275	.6118111	.1836091	1.8346
.6300	.6142081	.1840423	1.8382
.6325	.6166046	.1844773	1.8417
.6350	.6190006	.1849142	1.8453
.6375	.6213961	.1853530	1.8489
.6400	.6237911	.1857936	1.8524
.6425	.6261855	.1862361	1.8560
.6450	.6285794	.1866805	1.8595
.6475	.6309728	.1871268	1.8631
.6500	.6333656	.1875749	1.8667
.6525	.6357579	.1880250	1.8702
.6550	.6381497	.1884769	1.8738
.6575	.6405409	.1889307	1.8774
.6600	.6429316	.1893865	1.8810
.6625	.6453217	.1898441	1.8845
.6650	.6477113	.1903036	1.8881
.6675	.6501003	.1907658	1.8917
.6700	.6524888	.1912283	1.8953
.6725	.6548767	.1916935	1.8989
.6750	.6572640	.1921607	1.9025
.6775	.6596508	.1926297	1.9061
.6800	.6620370	.1931007	1.9097
.6825	.6644227	.1935735	1.9133
.6850	.6668077	.1940483	1.9169
.6875	.6691922	.1945251	1.9205
.6900	.6715761	.1950037	1.9241
.6925	.6739595	.1954843	1.9277
.6950	.6763422	.1959668	1.9313
.6975	.6787244	.1964512	1.9349
.7000	.6811059	.1969376	1.9386
.7050	.6858673	1979162	1.9458
.7100	.6900263	.1989026	1.9531
.7150	.6953828	.1998968	1.9603
.7200	.7001569	.2008988	1.9676
7250	.7048885	.2019087	1.9749
.7300	.7096376	.2029265	1.9822
.7350	.7143841	.2039522	1.9896
.7400	.7191282	.2049858	1.9969
.7450	.7238696	.2060274	2.0042
.7500	.7286085	.2070770	2.0116
.7550	.7333448	.2081346	2.0190
.7600	.7380783	.2092003	2.0263
.7650	.7428093	.2102741	2.0337
.7700	.7475365	.2117567	2.0412
.7750	.7522629	.2124460	2.0486
.7800	.7569857	.2135441	2.0560
.7850	.7617056	.2146505	2.0635

Table 1 (Continued)

(b) $M_d = 3.500$, $\eta_d = 0.130$, $(\xi < \xi_I)$

ξ	x	y	M
.7900	.7664228	.2157652	2.0709
.7950	.7711370	.21688[illegible]	2.0784
.8000	.7758485	.2180193	2.0859
.8050	.7805570	.2191588	2.0935
.8100	.7852626	.2203067	2.1010
.8150	.7899653	.2214630	2.1085
.8200	.7946650	.2226277	2.1161
.8250	.7993617	.2238009	2.1237
.8300	.8040554	.2249826	2.1313
.8350	.8087460	.2261729	2.1389
.8400	.8134335	.2273718	2.1465
.8450	.8181178	.2285792	2.1542
.8500	.8227991	.2297953	2.1619
.8550	.8274771	.2310202	2.1695
.8600	.8321519	.2322537	2.1772
.8650	.8368235	.2334961	2.1850
.8700	.8414918	.2347473	2.1927
.8750	.8461569	.2360073	2.2005
.8800	.8508185	.2372762	2.2083
.8850	.8554768	.2385541	2.2161
.8900	.8601318	.2398410	2.2239
.8950	.8647832	.2411369	2.2318
.9000	.8694312	.2424419	2.2397
.9050	.8740758	.2437560	2.2476
.9100	.8787168	.2450793	2.2555
.9150	.8833542	.2464118	2.2634
.9200	.8879880	.2477536	2.2714
.9250	.8926182	.2491048	2.2794
.9300	.8972448	.2504653	2.2873
.9350	.9018676	.2518352	2.2954
.9400	.9064867	.2532146	2.3035
.9450	.9111020	.2546035	2.3116
.9500	.9157136	.2560020	2.3197
.9550	.9203213	.2574101	2.3279
.9600	.9249251	.2588280	2.3361
.9650	.9295250	.2602555	2.3443
.9700	.9341210	.2616029	2.3525
.9750	.9387130	.2631402	2.3608
.9800	.9433009	.2645973	2.3691
.9850	.9478849	.2[illegible]0645	2.3774
.9900	.9524647	.2675417	2.3858
.9950	.9570404	.2690289	2.3941
1.0000	.9616119	.2705264	2.4026
1.0033427*	.9646659	.2715332	2.4082

*Inflection point for M = 3.500 nozzle.

Table 1 (Continued)

(b) $M_d = 3.500,\ \eta_d = 0.130,\ (\xi > \xi_I)$

ξ	x	y	M
ξ_d = 2.4061630	5.366664	.8826504	3.5000
2.4050	5.360[illegible]7	.882553	3.4991
2.4000	5.33600	.882677	3.4953
2.3950	5.31126	.882586	3.4915
2.3900	5.28659	.882515	3.4877
2.3850	5.26204	.882429	3.4839
2.3800	5.23757	.882298	3.4801
2.3750	5.2132[illegible]	.882148	3.4764
2.3700	5.18892	.881972	3.4726
2.3650	5.16474	.881774	3.4688
2.3600	5.14066	.881554	3.4650
2.3550	5.11667	.881306	3.4612
2.3500	5.09276	.881029	3.4575
2.3450	5.06891	.880738	3.4537
2.3400	5.04524	.880415	3.4499
2.3350	5.02162	.880110	3.4462
2.3300	4.99809	.879704	3.4424
2.3200	4.951288	.8788983	3.4349
2.3100	4.904852	.8779842	3.4274
2.3000	4.858758	.8770066	3.4199
2.2900	4.813008	.8759242	3.4124
2.2800	4.767617	.8747515	3.4050
2.2700	4.722562	.8734929	3.3975
2.2600	4.677641	.8721460	3.3901
2.2500	4.633373	.8706852	3.3826
2.2400	4.589392	.8691944	3.3752
2.2300	4.545657	.8675938	3.3677
2.2200	4.502249	.8659109	3.3603
2.2100	4.459151	.8641449	3.3529
2.2000	4.416309	.8622990	3.3455
2.1900	4.373697	.8603944	3.3381
2.1800	4.331746	.8583705	3.3307
2.1700	4.289893	.8562891	3.3233
2.1600	4.2483[illegible]2	.8541313	3.3160
2.1500	4.207090	.8518982	.3086
.1400	4.1661[illegible]4	.849[illegible]	[illegible].3012
2.1300	4.125471	.847[illegible]	3.2939
2.1200	4.085099	.8447545	3.2865
2.1100	4.045013	.8422291	3.2792
2.1000	4.005215	.839[illegible]305	.2718
2.0900	3.965696	.836[illegible]	3 2645
2.0800	3.926458	.834[illegible]	3.[illegible]
2.0700	3.887496	.8314212	3.2498
2.0600	3.848808	.8285455	3.2425
2.0500	3.810393	.8256041	3.235[illegible]
2.0400	3.772245	.8225968	3.2279
2.0300	3.734365	.819524	3.2206
2.0200	3.696749	.8163856	3.2132
2.0100	3.659194	.8131[illegible]8	3.2059

Table 1 (Continued)

(h) $M_d = 3.500,\ \eta_d = 0.130,\ (\xi > \xi_p)$

ξ	x	y	M
2.0000	3.622298	.8099172	3.1986
1.9900	3.585460	.8065878	3.1913
1.9800	3.548875	.8031966	3.1840
1.9700	3.51[illegible]45	.7997497	3.1767
1.9600	3.476463	.7962298	3.1694
1.9500	3.440630	.7926554	3.1621
1.9400	3.405043	.7890209	3.1[illegible]4[illegible]
1.9300	3.369700	.7853280	3.1475
1.9200	3.334598	.7815758	3.1402
1.9100	3.299737	.7777655	3.1329
1.9000	3.265113	.7738980	3.1256
1.8900	3.230725	.7699734	3.1183
1.8800	3.196570	.7659921	3.1110
1.8700	3.162648	.7619549	3.1037
1.8600	3.128955	.7578627	3.0964
1.8500	3.095490	.7537153	3.0891
1.8400	3.062251	.7495118	3.0818
1.8300	3.029238	.7452578	3.0745
1.8200	2.996448	.7409486	3.0672
1.8100	2.963879	.7365868	3.0599
1.8000	2.931529	.7321699	3.0526
1.7900	2.899395	.7277059	3.0452
1.7800	2.867479	.7231878	3.0379
1.7700	2.835777	.7186188	3.0306
1.7600	2.804288	.7139994	3.0232
1.7500	2.773028	.7092912	3.0159
1.7400	2.741944	.7046103	3.0085
1.7300	2.7110855	.6998419	3.0011
1.7200	2.6804341	.6950246	2.9938
1.7100	2.6499910	.6901592	2.9864
1.7000	2.6197474	.6852461	2.9790
1.6900	2.5897091	.6802860	2.9716
1.6800	2.5593730	.6752789	2.9642
1.6700	2.5302373	.6702256	2.9568
1.6600	2.5[illegible]010	.6651265	2.9494
1.6500	2.4715[illegible]7	.6599822	2.9[illegible]1[illegible]
1.6400	2.442[illegible]	[illegible]	[illegible]
1.6300	2.4136760	.6495601	[illegible]27[illegible]
1.6200	2.385025[illegible]	.64[illegible]	[illegible]
1.6100	2.350560[illegible]	.[illegible]073	2.91[illegible]
1.6000	2.[illegible]1006	.[illegible]71	[illegible]04[illegible]
1.5900	2.[illegible]002377	.[illegible]81961	[illegible]70
1.5800	[illegible]7234[illegible]	[illegible]	[illegible]
1.5700	[illegible]46520	[illegible]170	[illegible]
1.5600	[illegible]	[illegible]1741[illegible]	[illegible]743
1.5500	[illegible]807660	[illegible]	[illegible]
1.5400	[illegible]7110	[illegible]	[illegible]
1.5300	[illegible]	[illegible]	[illegible]
1.5200	[illegible]100	[illegible]	[illegible]
1.5100	[illegible]	[illegible]	[illegible]

Table 1 (Concluded)

(h) $M_d = 3.500$. $\pi_d = 0.130$. ($\xi > \xi_I$)

ξ	x	y	M
1.5000	2.0560493	.5777484	2.8283
1.4900	2.0298426	.5720051	2.8208
1.4800	2.0038210	.5661841	2.8131
1.4700	1.9779801	.5603319	2.8053
1.4600	1.9523206	.5544464	2.7976
1.4500	1.9268412	.5485304	2.7898
1.4400	1.9015417	.5425838	2.7820
1.4300	1.8764387	.5365825	2.7741
1.4200	1.8514803	.5306030	2.7662
1.4100	1.8267170	.5245708	2.7583
1.4000	1.8021313	.5185121	2.7504
1.3900	1.7777229	.5124461	2.7425
1.3800	1.7534908	.5063197	2.7345
1.3700	1.7294350	.5001880	2.7265
1.3600	1.7055546	.4940343	2.7184
1.3500	1.6818494	.4878597	2.7104
1.3400	1.6583189	.4816653	2.7023
1.3300	1.6349625	.4754526	2.6942
1.3200	1.6117798	.4692227	2.6860
1.3100	1.5887705	.4629767	2.6778
1.3000	1.5659340	.4567263	2.6696
1.2900	1.5434438	.4502399	2.6613
1.2800	1.5207776	.4441568	2.6530
1.2700	1.4984568	.4378608	2.6447
1.2600	1.4763042	.4315555	2.6363
1.2500	1.4543281	.4252428	2.6279
1.2400	1.4325190	.4189238	2.6195
1.2300	1.4108797	.4126000	2.6110
1.2200	1.3894097	.4062732	2.6025
1.2100	1.3681082	.3999447	2.5939
1.2000	1.3469749	.3936161	2.58[illegible]
1.1900	1.3260026	.387[illegible]475	2.5767
1.1800	1.3052111	.3809650	2.5[illegible]81
1.1700	1.2845794	.3746456	[illegible]
1.1600	1.2641161	[illegible]	2.5[illegible]
1.1500	1.2438136	.3620[illegible]74	2.54[illegible]
1.1400	1.2236785	.3557318	[illegible]
1.1300	[illegible]	[illegible]	[illegible]
1.1200	1.1839001	.343[illegible]761	2.51[illegible]
1.1100	1.16423[illegible]	.3[illegible]91[illegible]	[illegible]
1.10[illegible]	1.1[illegible]	.3[illegible]6787	2.4[illegible]
1.0900	1.1254535	.3[illegible]	[illegible]
1.0800	1.1062943	.318[illegible]33	[illegible]
1.0700	1.0873028	.312071[illegible]	2.4[illegible]
1.0600	1.0684544	.30591[illegible]	[illegible]
1.0500	1.04977[illegible]1	.2998[illegible]60	[illegible]
1.0400	1.0312[illegible]	.293[illegible]716	[illegible]
1.0300	1.01[illegible]	.287[illegible]	[illegible]
1.0200	.994[illegible]	.281[illegible]410	[illegible]
1.0100	.9761[illegible]	[illegible]	[illegible]

Table 2

Design Characteristic Coordinates

(a) M_d = 1.500

	ξ	η	x	y
ξ_d =	.4197225	.0000000	.4197226	.0000000
	.4175	.0016943	.4174986	.0019897
	.4150	.0036100	.4149937	.0042318
	.4125	.0055362	.4124852	.0064783
	.4100	.0074729	.4099733	.0087292
	.4075	.0094270	.4074578	.0109846
	.4050	.0113776	.4049390	.0132444
	.4025	.0133457	.4024167	.0155088
	.4000	.0153242	.39989[illegible]	.0177776
	.3975	.0173133	.3973620	.0200509
	.3950	.0193127	.3948297	.0223289
	.3925	.0213227	.3922941	.0246113
	.3900	.0233430	.3897552	.0268984
	.3875	.0253738	.3872131	.0291901
	.3850	.0274150	.3846678	.0314864
	.3825	.0294666	.3821193	.0337074
	.3800	.0315286	.3795677	.0360930
	.3775	.0336010	.3770131	.0384033
	.3750	.0356838	.3744554	.0407183
	.3725	.0377768	.3718947	.0430380
	.3700	.0398802	.3693310	.0453625
	.3675	.0419939	.3667644	.0476916
	.3650	.0441179	.3641949	.0500255
	.3625	.0462521	.3616226	.0523641
	.3600	.0483966	.3590475	.0547075
	.3575	.0505512	.3564697	.0570556
	.3550	.0527160	.3538891	.0594085
	.3525	.0548909	.3513060	.0617662
	.3500	.0570759	.3487202	.0641286
	.3475	.0592710	.3461318	.0664958
	.3450	.0614760	.3435410	.0688677
	.3425	.0636911	.3409477	.0712444
	.3400	.0659161	.3383520	.0736[illegible]
	.3375	.0681510	.3357519	.0760120
	.3350	.0703957	.3331536	.0784028
	.3325	.072[illegible]12	.3305510	.0807985
	.3300	[illegible]	[illegible]	.08[illegible]798
	.3275	.0771983	.3253395	.0856038
	.3250	.0794718	.3227106	.0880133
	.3225	.0817649	.3201[illegible]7	.0904278
	.3200	[illegible]	[illegible]	.09[illegible]468
	.3175	.08[illegible]704	.31[illegible]	.09[illegible]701
	.3150	.0887008	.31[illegible]	.097[illegible]
	.3125	.0910314	.3096579	.1001307
	.3100	.0933718	.3070[illegible]	.1025678
	.3075	[illegible]	[illegible]	.1050[illegible]
	.3050	.0980781	.3017[illegible]	.1074[illegible]
	.3025	.1004450	[illegible]	[illegible]
	.3000	[illegible]	[illegible]	[illegible]

Table 2 (Continued)

(a) $M_d = 1.500$

ξ	η	x	y
.2975	.1052052	.2939158	.1148187
.2950	.1075984	.2912874	.1172816
.2925	.1100001	.2886579	.1197487
.2900	.1124102	.2860274	.1222199
.2875	.1148287	.2833958	.1246950
.2850	.1172553	.2807633	.1271741
.2825	.1196901	.2781300	.1296569
.2800	.1221328	.2754960	.1321435
.2775	.1245832	.2728613	.1346338
.2750	.1270414	.2702260	.1371276
.2725	.1295071	.2675902	.1396249
.2700	.1319801	.2649541	.1421254
.2675	.1344604	.2623176	.1446293
.2650	.1369477	.2596810	.1471362
.2625	.1394419	.2570442	.1496461
.2600	.1419427	.2544075	.1521588
.2575	.1444501	.2517708	.1546742
.2550	.1469638	.2491343	.1571921
.2525	.1494835	.2464981	.1597125

Table 2 (Continued)

(b) $M_d = 1.712$

ξ	η	x	y
ξ_d = .59077	.0000000	.59077	.0000000
.5850	.0030955	.58499	.0041549
.5800	.0058063	.57997	.0077597
.5750	.0085433	.57497	.011368
.5700	.011307	.56990	.014982
.5650	.014097	.56445	.018599
.5600	.016914	.55979	.022222
.5550	.019757	.55472	.025849
.5500	.022627	.54963	.029481
.5450	.025523	.54454	.033116
.5400	.028446	.53943	.036757
.5350	.031395	.53432	.040403
.5300	.034371	.52920	.044054
.5250	.037373	.52407	.047709
.5200	.0404[illegible]	.51892	.05[illegible]70
.5150	.043457	.51377	.055036
.5100	.046539	.50861	.058707
.5050	.049647	.50344	.062384
.5000	.052781	.49826	.066065
.4950	.055942	.49307	.069753
.4900	.059129	.48787	.073446
.4850	.062342	.48267	.077145
.4800	.065381	.47746	.080848
.4750	.068846	.47224	.084559
.4700	.072137	.46702	.088274
.4650	.075454	.46178	.091996
.4600	.078796	.45654	.095721
.4550	.082164	.45129	.099455
.4500	.085557	.44604	.10319
.4450	.088976	.44078	.10694
.4400	.092420	.43552	.11069
.4350	.095888	.43025	.11444
.4300	.099381	.42497	.11821
.4250	.10290	.41969	.12197
.4200	.10644	.41440	.12575
.4150	.11001	.40911	.12953
.4100	.11360	.4[illegible]8[illegible]	[illegible]
.4050	.11721	.39852	.13710
.4000	.12085	.39322	.14090
.3950	.12451	.38792	.14470
.3900	.12819	.38262	.14850
.3850	.13190	.37731	.15232
.3800	.13563	.37200	.15614
.3750	.13938	.36669	.15997
.3700	.14315	.36148	.16379
.3650	.14694	.35608	.16763
.3600	.15075	.35076	.17148
.3550	.15458	.34545	.17530
.3500	.15843	.34014	.17914

Table 2 (Continued)

(b) M_d = 1.712

ξ	η	x	y
.3450	.16229	.33483	.18195
.3400	.16617	.32953	.18582
.3350	.17007	.32422	.19067
.3300	.17398	.31892	.19451
.3250	.17791	.31363	.19836
.3200	.18186	.30833	.20221
.3150	.18582	.30304	.20606
.3100	.18979	.29776	.20991
.3050	.19377	.29248	.21375

Table 2 (Continued)

(c) $M_d = 2.25$

	ξ	η	x	y
ξ_d =	1.0471079	.0000000	1.0471079	.0000000
	1.0450	.0004997	1.0449995	.0010454
	1.0400	.0016918	1.0399938	.0035217
	1.0350	.0028936	1.0349821	.0059934
	1.0300	.0041050	1.0299642	.0084603
	1.0250	.0053261	1.0249404	.0109225
	1.0200	.0065570	1.0199105	.0133800
	1.0150	.0077977	1.0148746	.0158329
	1.0100	.0090482	1.0098328	.0182811
	1.0050	.0103086	1.0047851	.0207247
	1.0000	.0115789	.9997316	.0231637
	.9950	.0128592	.9946721	.0255981
	.9900	.0141496	.9896069	.0280279
	.9850	.0154500	.9845359	.0304532
	.9800	.0167605	.9794591	.0328739
	.9750	.0180811	.9743767	.0352900
	.9700	.0194119	.9692885	.0377017
	.9650	.0207530	.9641948	.0401088
	.9600	.0221044	.9590954	.0425115
	.9550	.0234660	.9539905	.0449097
	.9500	.0248380	.9488800	.0473035
	.9450	.0262204	.9437640	.0496928
	.9400	.0276133	.9386426	.0520777
	.9350	.0290166	.9335158	.0544582
	.9300	.0304305	.9283836	.0568344
	.9250	.0318549	.9232461	.0592062
	.9200	.0332899	.9181033	.0615736
	.9150	.0347355	.9129552	.0639367
	.9100	.0361918	.9078019	.0662955
	.9050	.0376588	.9026435	.0686501
	.9000	.0391366	.8974799	.0710004
	.8950	.0406252	.8923113	.0733464
	.8900	.0421247	.8871376	.0756882
	.8850	.0436347	.8819590	.0780258
	.8800	.0451558	.8767754	.0803592
	.8750	.0466878	.8715870	.0826884
	.8700	.0482308	.8663937	.0850135
	.8650	.0497848	.8611956	.0873345
	.8600	.0513497	.8559[illegible]	.0896514
	.8550	.0529258	.85078[illegible]	.0919642
	.8500	.0545129	.8455732	.0942729
	.9450	.0561111	.8403565	.0965776
	.8400	.0577204	.83513[illegible]	.0988782
	.8350	.0593409	.8299096	.1011749
	.8300	.0609726	.8246795	.1034676
	.8250	.0626155	.8194452	.1057563
	.8200	.0642696	.8142065	.1080411
	.8150	.0659350	.8089636	.1103220
	.8100	.0676117	.8037166	.1125991

Table 2 (Continued)

(c) $M_d = 2.25$

ξ	η	x	y
.8050	.0692997	.7984655	.1148722
.8000	.0709990	.7932103	.1171415
.7950	.0727097	.7879513	.1194070
.7900	.0744318	.7826883	.1216688
.7850	.0761652	.7774216	.1239267
.7800	.0779100	.7721511	.1261809
.7750	.0796663	.7668770	.1284314
.7700	.0814340	.7615992	.1306783
.7650	.0832131	.7563180	.1329211
.7600	.0850037	.7510334	.1351609
.7550	.0868058	.7457454	.1373969
.7500	.0886193	.7404542	.1396292
.7450	.0904444	.7351597	.1418580
.7400	.0922810	.7298622	.1440833
.7350	.0941290	.7245617	.1463051
.7300	.0959886	.7192583	.1485234
.7250	.0978597	.7139520	.1507383
.7200	.0997423	.7086431	.1529498
.7150	.1016365	.7033315	.1551179
.7100	.1035421	.6980173	.1573627
.7050	.1054593	.6927007	.1595642
.7000	.1073881	.6873818	.1617624
.6950	.1093283	.6820606	.1639574
.6900	.1112801	.6767373	.1661492
.6850	.1132433	.6714120	.1683378
.6800	.1152181	.6660847	.1705233
.6750	.1172044	.6607557	.1727057
.6700	.1192021	.6554249	.1748851
.6650	.1212114	.6500925	.1770614
.6600	.1232321	.6447587	.1792348
.6550	.1252642	.6394235	.1814053
.6500	.1273078	.6340871	.1835725
.6450	.1293628	.6287495	.1857375
.6400	.1314292	.6234109	.1878944
.6350	.1335070	.6180715	.1900486
.6300	.1355962	.6127313	.1922150
.6250	.1376967	.6073904	.1943668
.6200	.1398085	.6020491	.1965200
.6150	.1419317	.5967074	.1986686
.6100	.1440660	.5913657	.2008147
.6050	.1462117	.5860234	.2029583
.6000	.1483685	.5806814	.2050925
.5950	.1505365	.5753396	.2072184
.5900	.1527157	.5699981	.2093750
.5850	.1549060	.5646570	.2115093
.5800	.1571074	.5593169	.2136410
.5750	.1593190	.5539768	.2157719
.5700	.1615432	.5486379	.2178994
.5650	.1637777	.5433000	.2200254

Table 2 (Continued)

(c) $M_d = 2.25$

ξ	η	x	y
.5600	.1660230	.5379634	.2221495
.5550	.1682793	.5326280	.2242717
.5500	.1705464	.5272[illegible]	.2263921
.5450	.1728243	.5219619	.2285107
.5400	.1751125	.5166315	.2306278
.5350	.1774123	.5112030	.2327432
.5300	.1797224	.5059766	.2348571
.5250	.1820431	.5006524	.2369697
.5200	.1843743	.4953307	.2390805
.5150	.1867161	.4900115	.24[illegible]1908
.5100	.1890684	.4846951	.2432995
.5050	.1914310	.4793816	.2454071
.5000	.1938041	.4740712	.2475138
.4950	.1961874	.4687640	.2496195
.4900	.1985810	.4634602	.2517244

Table 2 (Continued)

(d) $M_d = 2.50$

ξ	η	x	y
ξ_d = 1.27934	.00000	1.27934	.00000
1.2700	.00168	1.26999	.00439
1.2600	.00336	1.25996	.00869
1.2500	.00509	1.24991	.01304
1.2400	.01037	1.23985	.01728
1.2300	.00859	1.22977	.02159
1.2200	.01037	1.21967	.02580
1.2100	.01220	1.2095[illegible]	.03[illegible]07
1.2000	.01402	1.19942	.03423
1.1900	.01591	1.18927	.03847
1.1800	.01779	1.17911	.04260
1.1700	.01973	1.16892	.04679
1.1600	.02166	1.15872	.05088
1.1500	.02365	1.14850	.05501
1.1400	.02564	1.13828	.05906
1.1300	.02769	1.12802	.06317
1.1200	.02973	1.11777	.06717
1.1100	.03183	1.10749	.07123
1.1000	.03393	1.09721	.07519
1.0900	.03610	1.08689	.07927
1.0800	.03826	1.07659	.08317
1.0700	.04048	1.06623	.08714
1.0650	.04158	1.06107	.08909
1.0600	.04269	1.05591	.09101
1.0550	.04383	1.05072	.09299
1.0500	.04497	1.04554	.09496
1.0450	.04611	1.04035	.09689
1.0400	.04725	1.03517	.09881
1.0350	.04842	1.02998	.10077
1.0300	.04960	1.02478	.10273
1.0250	.05077	1.01958	.1046[illegible]
1.0200	.05194	1.01438	.1065[illegible]
1.0150	.05314	1.00918	.10849
1.0100	.05434	1.00797	.11040
1.0050	.05554	.99877	.11230
1.0000	.05674	.99356	.11417
.9950	.05797	.9883[illegible]	.11604
[illegible]	.05[illegible]1	[illegible]	.11800
.9850	.06014	.977[illegible]1	[illegible]
.9800	.06168	.97270	[illegible]
.9750	.06294	.9674[illegible]	.12364
.9700	.06421	.96224	.12552
.9650	.06547	.95701	.127[illegible]9
.9600	.06674	.951[illegible]	.129[illegible]
.9550	.06804	[illegible]	.1[illegible]
.9500	.06934	.941[illegible]	.1[illegible]98
.9450	.07054	[illegible]	.1[illegible]
.9400	.07194	[illegible]	.1[illegible]
.9350	.073[illegible]	[illegible]	.1[illegible]

Table 2 (Continued)

(d) $M_d = 2.50$

ξ	η	x	y
.9300	.07461	.92035	.14037
.9250	.07594	.91510	.14221
.9200	.07728	.90985	.14401
.9150	.07865	.90460	.14587
.9100	.08002	.89935	.14770
.9050	.08138	.89410	.14949
.9000	.08275	.88884	.15129
.8950	.08415	.88359	.15312
.8900	.08556	.87832	.15494
.8850	.08696	.87307	.15673
.8800	.08836	.86780	.15851
.8750	.08980	.86254	.16032
.8700	.09124	.85727	.16212
.8650	.09268	.85201	.16391
.8600	.09412	.84675	.16566
.8550	.09559	.84148	.16746
.8500	.09706	.83620	.16922
.8450	.09852	.83094	.17097
.8400	.09999	.82567	.17270
.8350	.10150	.82040	.17449
.8300	.10302	.81513	.17627
.8250	.10453	.80985	.17801
.8200	.10604	.80458	.17973
.8150	.10759	.79930	.18150
.8100	.10914	.79402	.18327
.8050	.11069	.78875	.185[illegible]0
.8000	.11224	.78347	.18671
.7950	.11383	.77819	.18847
.7900	.11542	.77290	.19022
.7850	.11700	.76763	.19193
.7800	.11859	.76236	.19364
.7750	.12022	.75707	.19539
.7700	.12185	.75179	.19712
.7650	.12347	.74651	.19882
.7600	.12510	.741[illegible]4	.20052
.7550	.12676	.73595	.20224
.7500	.12843	.7[illegible]067	.20396
.74[illegible]0	.1[illegible]	.7[illegible]	.20566
.7[illegible]	.13176	.7[illegible]	.2[illegible]
.7350	.13[illegible]	.71483	.2[illegible]07
.7300	.13513	.70955	.[illegible]074
.7250	.13698	.704[illegible]0	.2[illegible]24[illegible]
.7200	.13[illegible]	.[illegible]98[illegible]	.2141[illegible]
.7150	.140[illegible]	.[illegible]	.[illegible]
.7100	.1420[illegible]	.[illegible]844	[illegible]
.7050	.14[illegible]	.[illegible]117	[illegible]
.7000	.14[illegible]7	.[illegible]7790	[illegible]
.6950	.147[illegible]	.[illegible]72[illegible]	[illegible]
.6900	.1491[illegible]	.[illegible]714	[illegible]

Table 2 (Continued)

(d) $M_d = 2.50$

ξ	η	x	y
.6850	.15093	.66207	.22596
.6800	.15272	.65681	.227[illegible]2
.6750	.15455	.65153	.22932
.6700	.15638	.64626	.23100
.6650	.15821	.64099	.23266
.6600	.16004	.63573	.23477
.6550	.16191	.63046	.23601
.6500	.16379	.62520	.2[illegible]
.6450	.16566	.61993	.23937
.6400	.16753	.61468	.24101
.6350	.16944	.60942	.24270
.6300	.17136	.60416	.24438
.6250	.17327	.59891	.24604
.6200	.17519	.59366	.24768
.6150	.17715	.58840	.24938
.6100	.1[illegible]11	.58315	.25106
.6050	.18106	.57791	.25270
.6000	.18302	.57265	.25436
.5950	.18502	.56442	.25604
5900	.18702	.56218	.25771
.5850	.18902	.55695	.25938
.5800	.19102	.55171	.26101
.5750	.19306	.54648	.26270
.5700	.19511	.54175	.26438
.5650	.19715	.53603	.26604
.5600	.19919	.53081	.26768

Table 2 (Continued)

(e) $M_d = 2.75$

ξ	η	x	y
ξ_d = 1.5289400	.0000000	1.5289400	0000000
1.5250	.0004620	1.5249965	.0018365
1.5200	.0010518	1.5199944	.0034818
1.5150	.0016454	1.5149865	.0054222
1.5100	.0022430	1.5099751	.0073578
1.5050	.002[illegible]5	1.5049602	.0092879
1.5000	.0034500	1.4999420	.0112133
1.4950	.0040595	1.4949203	.0131337
1.4900	.0046729	1.4898952	.0150490
1.4850	.0052904	1.4848667	.0169594
1.4800	.0059119	1.4798349	.0188647
1.4750	.0065374	1.4747997	.0207650
1.4700	.0071671	1.4697611	.0226603
1.4650	.0078008	1.464[illegible]192	.0245506
1.4600	.0084386	1.459[illegible]740	.0264359
1.4550	.0090806	1.4546253	.0283162
1.4500	.0097268	1.4495738	.0301915
1.4450	.0103771	1.4445185	.0320617
1.4400	.0110316	1.4394602	.0339269
1.4350	.0116904	1.4343986	.0357871
1.4300	.0123534	1.4293337	.0376423
1.4250	.0130207	1.4242656	.0394925
1.4200	.0136922	1.4191943	.0413376
1.4150	.0143681	1.4141198	.0431777
1.4100	.0150483	1.4090422	.0450128
1.4050	.0157328	1.4039613	.0468429
1.4000	.0164218	1.3988773	.0486679
1.3950	.0171151	1.3937902	.0504879
1.3900	.0178128	1.3886999	.0523029
1.3850	.018515[illegible]	1.3836064	.0541128
1.3800	.0192217	1.3785101	.0559177
1.3750	.0199428	1.3734106	.0577176
1.3700	.0206485	1.3683080	.0595124
1.3650	.0213686	1.3632027	.0613022
1.[illegible]550	[illegible]	1.[illegible]	[illegible]
[illegible]	[illegible]	1.[illegible]	[illegible]
1.3[illegible]	.023[illegible]	1.[illegible]	[illegible]
1.[illegible]450	[illegible]	1.[illegible]	[illegible]
1.[illegible]400	[illegible]	1.3[illegible]	.0701[illegible]
1.[illegible]50	[illegible]	1.[illegible]05	[illegible]
1.[illegible]100	[illegible]	1.[illegible]	[illegible]
1.[illegible]50	[illegible]	1.[illegible]	[illegible]
1.[illegible]	[illegible]	1.[illegible]	[illegible]
1.[illegible]50	[illegible]	1.[illegible]17	[illegible]
1.[illegible]100	[illegible]	1.[illegible]	[illegible]
1.[illegible]	[illegible]	1.[illegible]	[illegible]
1.[illegible]	[illegible]	1.[illegible]	.084110[illegible]
1.[illegible]	[illegible]	1.[illegible]	[illegible]
1.[illegible]	[illegible]	1.[illegible]	[illegible]

Table 2 (Continued)

(c) M_d = 2.75

ξ	η	x	y
1.2850	.0335264	1.2811107	.0892533
1.2800	.0343271	1.2759558	.0909574
1.2750	.0351327	1.2707982	.0926565
1.2700	.0359434	1.2656379	.0943505
1.2650	.0367590	1.2604748	.0960394
1.2600	.0375797	1.2553091	.0977234
1.2550	.0384054	1.2501407	.0994022
1.2500	.0392361	1.2449697	.1010761
1.2450	.0400720	1.2397961	.1027449
1.2400	.0409129	1.2346199	.1044087
1.2350	.0417590	1.2294412	.1060674
1.2300	.0426103	1.2242599	.1077211
1.2250	.0434668	1.2190761	.1093698
1.2200	.0443284	1.2138898	.1110134
1.2150	.0451953	1.2087010	.1126520
1.2100	.0460675	1.2035097	.1142856
1.2050	.0469450	1.1983161	.1159142
1.2000	.0478277	1.1931200	.1175377
1.1950	.0487158	1.1879215	.1191563
1.1900	.0496093	1.1827207	.1207698
1.1850	.0505081	1.1775176	.1223783
1.1800	.0514124	1.1723122	.1239818
1.1750	.0523221	1.1671045	.1255803
1.1700	.0532372	1.1618945	.1271738
1.1650	.0541579	1.1566824	.1287623
1.1600	.0550840	1.1514680	.1303458
1.1550	.0560157	1.1462515	.1319244
1.1500	.0569529	1.1410328	.1334979
1.1450	.0578957	1.1358120	.1350665
1.1400	.0588442	1.1305892	.1366301
1.1350	.0597982	1.1253643	.1381888
1.1300	.0607580	1.1201373	.1397425
1.1250	.0617234	1.1149084	.1412912
1.1200	.0626945	1.1096775	.1428351
1.1150	.0636714	1.1044447	.14437[illegible]
1.1100	.0646540	1.0992100	.1459079
1.1050	.0656424	[illegible]	[illegible]
1.1000	.0666367	1.0887350	[illegible]
1.0950	.0676367	1.083[illegible]94[illegible]	.15[illegible]803
1.0900	.0686427	1.078[illegible]	.15[illegible]947
1.0850	.0696545	1.07[illegible]	.15[illegible]
1.0800	.0706723	1.0[illegible]77617	.15[illegible]
1.0750	.0716960	[illegible]	[illegible]
1.0700	.07272[illegible]	[illegible]	[illegible]
1.0650	.07376[illegible]	[illegible]	[illegible]
1.0600	.07480[illegible]	1.0467[illegible]	.160[illegible]
1.0550	.0758[illegible]	1.041[illegible]	[illegible]
1.0500	.07690[illegible]	1.0[illegible]	[illegible]
1.0450	.07[illegible]	1.0310[illegible]	[illegible]

Table 2 (Continued)

(e) $M_d = 2.75$

ξ	η	x	y
1.0400	.0790306	1.0257431	.1668720
1.0350	.0801028	1.0204840	.1683333
1.0300	.0811812	1.0152235	.1697900
1.0250	.0822659	1.0099616	.1712420
1.0200	.0833568	1.0046986	.1726892
1.0150	.0844539	.9994342	.1741318
1.0100	.0855573	.9941687	.1755697
1.0050	.0866671	.9889021	.1770030
1.0000	.0877832	.9836343	.1784317
.9950	.0889057	.9783655	.1798558
.9900	.0900346	.9730956	.1812753
.9850	.0911699	.9678248	.1826903
.9800	.0923117	.9625530	.1841007
.9750	.0934600	.9572802	.1855067
.9700	.0946149	.9520067	.1869081
.9650	.0957762	.9467323	.1883051
.9600	.0969442	.9414571	.1896977
.9550	.0981187	.9361812	.1910860
.9500	.0992999	.9309046	.1924698
.9450	.1004878	.9256274	.1938493
.9400	.1016823	.9203496	.1952245
.9350	.1028836	.9150711	.1965955
.9300	.1040917	.9097922	.1979621
.9250	.1053065	.9045129	.1993247
.9200	.1065281	.8992330	.2006831
.9150	.1077566	.8939528	.2020373
.9100	.1089920	.8886723	.2033874
.9050	.1102342	.8833915	.2047335
.9000	.1114834	.8781105	.2060755
.8950	.1127396	.8728292	.2074136
.8900	.1140028	.8675478	.2087478
.8850	.1152730	.8622664	.2100180
.8800	.1165502	.8569848	.2114044
.8750	.1178346	.8517033	.2127271
.8700	.1191261	.8464218	.2140459
.8650	.1204247	.84[illegible]1424	.21[illegible]461[illegible]
.8600	.1217305	.8358592	.2166726
.8550	.1230436	.8305781	.2179805
.8500	.124[illegible]49	.8252[illegible]9	.2192849
.8450	.1256915	.8200188	.2205[illegible]
.8400	.1270264	.8147166	.2218532
.8350	.128[illegible]686	.8094461	.2231772
.8300	.1297183	.8041774	.2244679
.8250	.1310753	.7988985	.2257[illegible]
.8200	.1324398	.7936202	.2270[illegible]
.8150	.1338118	.7883425	.2283[illegible]07
.8100	.1351914	.7830654	.2295[illegible]87
.8050	.1365724	.7777690	.2[illegible]717
.8000	.1379731	.7725113	.2[illegible]1457

Table 2 (Continued)

(e) M_d - 2.75

ξ	η	x	y
.7950	.1393754	.7672365	.2334149
.7900	.1407853	.7619645	.2346612
.7850	.1422030	.7566914	.2359448
.7800	.1436283	.7514192	.2372057
.7750	.1450615	.7461481	.2384640
.7700	.1465024	[illegible]	.2397198
.7650	.1479511	.7356091	.2409731
.7600	.1494076	.7303413	.2422241
.7550	.1508723	.7250747	.2434728
.7500	.1523447	.7198094	.2447192
.7450	.1538252	.7145454	.2459636
.7400	.1553136	.7092328	.2472059
.7350	.1568101	.7040216	.2484462
.7300	.1583147	.6987620	.2496847
.7250	.1598274	.6935039	.2509214

Table 2 (Continued)

(f) $M_d = 3.00$

ξ	η	x	y
ξ_d = 1.79849	.0000000	1.79849	.0000000
1.7900	.0007124	1.79000	.0029951
1.7800	.0015617	1.77998	.0065099
1.7700	.0024201	1.76996	.010002
1.7600	.0032887	1.75993	.0134[illegible]7
1.7500	.0041676	1.74988	.016933
1.7400	.0050572	1.73983	.020372
1.7300	.0059569	1.72974	.023792
1.7200	.0068684	1.71967	.027198
1.7100	.0077894	1.70959	.030581
1.7000	.0087211	1.69949	.033945
1.6900	.0096637	1.68639	.037291
1.6800	.010617	1.6792[illegible]	.040616
1.6700	.011582	1.66915	.043926
1.6600	.012558	1.65902	.047223
1.6500	.013543	1.64886	.050487
1.6400	.014544	1.63872	.05[illegible]742
1.6300	.015554	1.62856	.056974
1.6200	.016576	1.61838	.060190
1.6100	.017610	1.60821	.063387
1.6000	.018656	1.59802	.066566
1.5900	.019714	1.58782	.069726
1.5800	.020784	1.57761	.072867
1.5700	.021867	1.56739	.075991
1.5600	.022962	1.55718	.079095
1.5500	.024070	1.54693	.082181
1.5400	.025190	1.53670	.085247
1.5300	.026321	1.52645	.088286
1.5200	.027467	1.51520	.091314
1.5100	.028626	1.50594	.094323
1.5000	.029796	1.49566	.097305
1.4900	.030982	1.48540	.10028
1.4800	.03218[illegible]	1.47512	.10343
1.4700	.033396	1.46481	.10618
1.4600	.034623	1.45452	.10908
1.4500	.035864	1.4442[illegible]	.11[illegible]
1.4400	.037[illegible]	1.4[illegible]	.11465
1.4300	.038390	1.42358	.1[illegible]
1.4200	.039675	1.41326	.1[illegible]
1.4100	.04097[illegible]	1.4025[illegible]	.12337
1.4000	.042288	1.3925[illegible]	.12618
1.3900	.043617	1.3[illegible]	.1[illegible]
1.3800	.04496[illegible]	1.37190	.1[illegible]173
1.3700	.046[illegible]	1.36[illegible]	.1[illegible]
1.3600	.047698	1.35[illegible]	.1[illegible]
1.3500	.049090	1.340[illegible]2	.1[illegible]
1.3400	.050498	1.3[illegible]045	.14[illegible]
1.3300	.051[illegible]	1.3[illegible]00[illegible]	.145[illegible]
1.3200	.053[illegible]	1.30964	.14[illegible]

Table 2 (Continued)

(f) $M_d = 3.00$

ξ	η	x	y
1.3100	.054819	1.29931	.15057
1.3000	.056293	1.28892	.15319
1.2900	.057784	1.27852	.15579
1.2800	.059292	1.26812	.15838
1.2700	.060817	1.25773	.16094
1.2600	.062360	1.24732	.16348
1.2500	.063921	1.23691	.16602
1.2400	.065500	1.22650	.16852
1.2300	.067098	1.21609	.17102
1.2200	.068716	1.20567	.17347
1.2100	.070352	1.19524	.17596
1.2000	.072006	1.18482	.17840
1.1900	.073680	1.17439	.18083
1.1800	.075373	1.16396	.18324
1.1700	.077086	1.15353	.18563
1.1600	.078819	1.14310	.18801
1.1500	.080572	1.13266	.19037
1.1400	.082346	1.12223	.19271
1.1300	.084141	1.11178	.19504
1.1200	.085957	1.10134	.19735
1.1100	.087795	1.09091	.19965
1.1000	.089654	1.08046	.20193
1.0900	.091537	1.07002	.20420
1.0800	.093441	1.05958	.20645
1.0700	.095368	1.04912	.20869
1.0600	.097318	1.03868	.21091
1.0500	.099291	1.02823	.21313
1.0400	.10129	1.01779	.21533
1.0300	.10331	1.00734	.21751
1.0200	.10536	.99690	.21970
1.0100	.10743	.98645	.22186
1.0000	.10953	.97601	.22401
.9900	.11165	.96557	.22615
.9800	.11380	.95512	.22828
.9700	.11597	.94468	.23040
.9600	.11817	.93424	.23251
.9500	.12040	.92380	.23460
.9400	.12265	.91337	.23668
.9300	.12493	.90293	.23876
.9200	.12724	.89250	.24084
.9100	.12958	.88206	.24290
.9000	.13194	.87164	.24494
.8900	.13433	.86122	.24697
.8800	.13679	.85080	.24901
.8700	.13920	.84039	.25103
.8600	.14168	.82997	.25306
.8500	.14419	.81956	.25507
.8400	.14674	.80915	.25709
.8300	.14932	.79874	.25912

Table 2 (Continued)

(g) $M_d = 3.25$

	ξ	η	x	y
$\xi_d =$	2.0902377	.0000000	2.0902377	.0000000
	2.0900	.0000143	2.0900000	.0000769
	2.0850	.0003163	2.0849989	.0016916
	2.0800	.0006200	2.0799957	.0033022
	2.0750	.0009252	2.0749906	.0049088
	2.0700	.0012321	2.0699834	.0065114
	2.0650	.0015405	2.0649742	.0081100
	2.0600	.0018506	2.0599630	.0097045
	2.0550	.0021624	2.0549498	.0112949
	2.0500	.0024758	2.0499346	.0128813
	2.0450	.0027908	2.0449174	.0144636
	2.0400	.0031075	2.0398983	.0160419
	2.0350	.0034259	2.0348771	.0176161
	2.0300	.0037460	2.0298540	.0191862
	2.0250	.0040677	2.0248290	.0207523
	2.0200	.0043911	2.0198020	.0223142
	2.0150	.0047163	2.0147730	.0238721
	2.0100	.0050431	2.0097421	.0254260
	2.0050	.0053720	2.0047092	.0269757
	2.0000	.0057020	1.9996744	.0285217
	1.9950	.0060340	1.9946377	.0300629
	1.9900	.0063677	1.9895991	.0316003
	1.9850	.0067032	1.9845585	.0331337
	1.9800	.0070405	1.9795161	.0346629
	1.9750	.0073795	1.9744717	.0361881
	1.9700	.0077202	1.9694255	.0377091
	1.9650	.0080629	1.9643773	.0392260
	1.9600	.0084073	1.9593273	.0407388
	1.9550	.0087535	1.9542754	.0422475
	1.9500	.0091015	1.9492217	.0437520
	1.9450	.0094513	1.9441660	.0452524
	1.9400	.0098029	1.9391086	.0467487
	1.9350	.0101564	1.9340492	.0482408
	1.9300	.0105117	1.9289880	.0497288
	1.9250	.0108688	1.9239250	.0512127
	1.9200	[illegible]	[illegible]	[illegible]
	1.9150	.0115888	[illegible]	[illegible]
	1.9100	[illegible]	1.9087250	[illegible]
	1.9050	[illegible]	[illegible]	[illegible]
	1.9000	[illegible]	[illegible]	[illegible]
	1.8950	[illegible]	[illegible]	[illegible]
	1.8900	[illegible]	[illegible]	.0614830
	1.8850	[illegible]	[illegible]	[illegible]
	1.8800	[illegible]	[illegible]	[illegible]
	1.8750	[illegible]	[illegible]	[illegible]
	1.8700	[illegible]	[illegible]	[illegible]
	1.8650	[illegible]	[illegible]	[illegible]
	1.8600	[illegible]	[illegible]	[illegible]
	1.8550	[illegible]	[illegible]	[illegible]

Table 4 (Continued)

(g) $M_d = 3.25$

ξ	η	x	y
1.8500	.0164546	1.8477639	.0729697
1.8450	.0168427	1.8426724	.0743866
1.8400	.0172327	1.8375792	.0757993
1.8350	.0176248	1.8324843	.0772078
1.8300	.0180188	1.8273877	.0786121
1.8250	.0184150	1.8222894	.0800121
1.8200	.0188132	1.8171893	.0814079
1.8150	.0192134	1.8120877	.0827994
1.8100	.0196157	1.8069843	.0841867
1.8050	.0200201	1.8018793	.0855698
1.8000	.0204266	1.7967726	.0869486
1.7950	.0208351	1.7916642	.0883231
1.7900	.0212458	1.7865543	.0896934
1.7850	.0216586	1.7814427	.0910594
1.7800	.0220735	1.7763294	.0924212
1.7750	.0224906	1.7712146	.0937786
1.7700	.0229098	1.7660981	.0951318
1.7650	.0233312	1.7609800	.0964808
1.7600	.0237548	1.7558604	.0978254
1.7550	.0241805	1.7507391	.0991657
1.7500	.0246085	1.7456163	.1005018
1.7450	.0250386	1.7404920	.1018335
1.7400	.0254710	1.7353660	.1031610
1.7350	.0259056	1.7302386	.1044841
1.7300	.0263424	1.7251095	.1058029
1.7250	.0267815	1.7199790	.1071174
1.7200	.0272228	1.7148469	.1084276
1.7150	.0276664	1.7097134	.1097335
1.7100	.0281123	1.7045783	.1110350
1.7050	.0285605	1.6994417	.1123322
1.7000	.0290110	1.6943037	.1136251
1.6950	.0294639	1.6891642	.1149137
1.6900	.0299169	1.6840232	.1161978
1.6850	.0303764	1.6788808	.1174777
1.6800	.0308362	1.6737369	.1187532
1.6750	.0312984	1.6685916	.1200243
1.6700	.0317630	1.6634449	.1212911
1.6650	.0322299	1.6582968	.1225535
1.6600	.0326993	1.65314[illegible]	.1238116
1.6550	.0331710	1.6479963	.1250647
1.6500	.0336452	1.6428440	.1263146
1.6450	.0341219	1.6376904	.1275595
1.6400	.0346009	1.6325354	.1288001
1.6350	.0350875	1.6273790	.1300363
1.6300	.0355665	1.6222213	.1312681
1.6250	.0360530	1.6170623	.1324958
1.6200	.0365420	1.6119020	.1337185
1.6150	.0370335	1.6067404	.1349371
1.6100	.0375275	1.6015775	.1361514

Table 2 (Continued)

(g) $M_d = 3.25$

ξ	η	x	y
1.6050	.0380241	1.5964133	.1373612
1.6000	.0385232	1.5912478	.1385666
1.5950	.0390249	1.5860811	.1397676
1.5900	.0395291	1.5809132	.1409642
1.5850	.0400360	1.5757440	.1421564
1.5800	.0405454	1.5705737	.1433442
1.5750	.0410575	1.5654021	.1445276
1.5700	.0415722	1.5602293	.1457065
1.5650	.0420895	1.5550554	.1468810
1.5600	.0426095	1.5498803	.1480511
1.5550	.0431322	1.5447040	.1492168
1.5500	.0436576	1.5395267	.1503784
1.5450	.0441856	1.5343482	.1515349
1.5400	.0447164	1.5291685	.1526873
1.5350	.0452499	1.5239878	.1538353
1.5300	.0457861	1.5188060	.1549786
1.5250	.0463251	1.5136232	.1561180
1.5200	.0468669	1.5084392	.1572526
1.5150	.0474115	1.5032543	.1583829
1.5100	.0479588	1.4980683	.1595087
1.5050	.0485090	1.4928813	.1606301
1.5000	.0490620	1.4876933	.1617470
1.4950	.0496179	1.4825043	.1628596
1.4900	.0501766	1.4773144	.1639676
1.4850	.0507382	1.4721234	.1650713
1.4800	.0513026	1.4669316	.1661705
1.4750	.0518700	1.4617388	.1672653
1.4700	.0524404	1.4565452	.1683557
1.4650	.1530136	1.4513506	.1694416
1.4600	.0535896	1.4461551	.1705231
1.4550	.0541690	1.4409588	.171600[illegible]
1.4500	.0547512	1.4357616	.1726729
1.4450	.0553364	1.4305636	.1737411
1.4400	.0559246	1.4253648	.1748049
1.4350	.0565158	1.4201652	.1758643
1.4300	.0571101	1.4149648	.1769193
1.4250	.0577075	1.4097636	.177[illegible]
1.4200	.0583080	1.404561[illegible]	.1790161
1.4150	.0589116	1.3993[illegible]90	.1800579
1.4100	.0595183	1.3941553	.1810952
1.4050	.0601281	1.38895[illegible]	.1821282
1.4000	.0607411	1.3837468	.1831566
1.3950	.0613573	1.3785413	.1841810
1.3900	.0619767	1.3733352	.1852009
1.3850	.0625993	1.3681284	.1862163
1.3800	.0632251	1.3629211	.1872274
1.3750	.0638542	1.3577131	.1882342
1.3700	.0644865	1.3525045	.1892366
1.3650	.0651222	1.3472954	.1902346

Table 2 (Continued)

(g) $M_d = 3.25$

ξ	η	x	y
1.3600	.0657611	1.3420857	.1912283
1.3550	.0664034	1.3368755	.1922177
1.3500	.0670490	1.3316647	.1932027
1.3450	.0676980	1.3264535	.1941834
1.3400	.0683504	1.3212417	.1951599
1.3350	.0690062	1.3160295	.1961320
1.3300	.0696654	1.3108168	.1970998
1.3250	.0703281	1.3056038	.1980634
1.3200	.0709942	1.3003903	[illegible]
1.3150	.0716639	1.2951763	.1999777
1.3100	.0723370	1.2899621	.2009285
1.3050	.0730137	1.2847474	.2018751
1.3000	.0736939	1.2795324	.2028174
1.2950	.0743777	1.2743171	.2037556
1.2900	.0750651	1.2691015	.2046895
1.2850	.0757562	1.2638856	.2056193
1.2800	.0764508	1.2586694	.2065449
1.2750	.0771492	1.2534529	.2074663
1.2700	.0778512	1.2482362	.2083836
1.2650	.0785570	1.2430193	.2092965
1.2600	.0792664	1.2378022	.2102059
1.2550	.0799797	1.2325849	[illegible]
1.2500	.0806967	1.2273675	.2120118
1.2450	.0814175	1.2221499	.2129087
1.2400	.0821422	1.2169322	.2138015
1.2350	[illegible]	1.2117143	.2146904
1.2300	.0836031	1.2064964	.2155752
1.2250	.0843394	1.2012784	.2164561
1.2200	.0850796	1.1960603	.2173329
1.2150	.0858238	1.1908422	.2182059
1.2100	.0865720	1.1856241	.2190750
1.2050	.0873241	1.1804060	.2199401
1.2000	.0880834	1.1751879	[illegible]
1.1950	.0888406	1.1699698	.2216589
1.1900	.0896050	1.1647518	[illegible]
1.1850	.0903735	1.1595339	[illegible]
1.1800	.0911461	1.1543161	[illegible]
1.1750	.0919229	1.1490983	[illegible]
1.1700	[illegible]	[illegible]	[illegible]
1.1650	.0934891	[illegible]	[illegible]
1.1600	.0942786	[illegible]	[illegible]
1.1550	.0950724	[illegible]	[illegible]
1.1500	[illegible]	[illegible]	[illegible]
1.1450	[illegible]	[illegible]	[illegible]
1.1400	[illegible]	[illegible]	[illegible]
1.1350	[illegible]	[illegible]	[illegible]
1.1300	[illegible]	[illegible]	[illegible]
1.1250	[illegible]	[illegible]	[illegible]
1.1200	[illegible]	[illegible]	[illegible]

Table 2 (Continued)

(g) $M_d = 3.25$

ξ	η	x	y
1.1150	.1015803	1.0865007	.2348170
1.1100	.1024140	1.0812860	.2356734
1.1050	.1032523	1.0760717	.2364664
1.1000	.1040952	1.0708578	.2372562
1.0950	.1049428	1.0656445	.2380427
1.0900	.1057950	1.0604312	.2388261
1.0850	.1066520	1.0552155	.2396063
1.0800	.1075138	1.0500063	.2403833
1.0750	.1083803	1.0447945	.2411573
1.0700	.1092517	1.0395833	.2419283
1.0650	.1101279	1.0343725	.2426963
1.0600	.1110090	1.0291623	.2434614
1.0550	.1118950	1.0239526	.2442235
1.0500	.1127861	1.0187435	.2449828
1.0450	.1136821	1.0135349	.2457393
1.0400	.1145831	1.0083270	.2464930
1.0350	.1154893	1.0031196	.2472440
1.0300	.1164005	.9979129	.2479923
1.0250	.1 73170	.9927068	.2487381
1.0200	.1182386	.9875014	.2494812
1.0150	.1191654	.9822967	.2502218
1.0100	.1200975	.9770926	.2509600
1.0050	.1210349	.9718893	.2516957
1.0000	.1219777	.9666867	.2524291
.9950	.1229258	.9614849	.2531601
.9900	.1238794	.9562838	.2538890
.9850	.1248384	.9510835	.2546156
.9800	.1258030	.9458841	.2553401
.9750	.1267731	.9406854	.2560625
.9700	.1277487	.9354876	.2567828
.9650	.1287301	.9302906	.2575013
.9600	.1297171	.9250945	.2582176
.9550	.1307098	.9198993	.2589324
.9500	.1117083	.9147050	.2596453
.9450	.1327126	.9095116	.2603565
.9400	.1337227	.9043191	.2610660
.9350	.1347388	.8991276	.2617740
.9300	.1357608	.8939371	[illegible]
.9250	.1367887	.8887476	.2631854
.9200	.1378227	.8835[illegible]	.2638890
.9150	.1388628	.8783716	.2645912
.9100	.1399090	.8731851	[illegible]

Table 2 (Continued)

(b) $M_d = 3.500$

	ξ	η	x	y
ξ_d =	2.4061630	.0000000	2.4061630	.0000000
	2.4050	.0000511	2.4050004	.0003470
	2.4000	.0002414	2.4000020	.0018349
	2.3950	.0004928	2.3949961	.0033195
	2.3900	.0007152	2.3899918	.0048006
	2.3850	.0009387	2.3849860	.0062781
	2.3800	.0011632	2.3799785	.0077522
	2.3750	.0013888	2.3749695	.0092227
	2.3700	.0016154	2.3699591	.0106896
	2.3650	.0018431	2.3649470	.0121530
	2.3600	.0020719	2.3599334	.0136129
	2.3550	.0023018	2.3549183	.0150692
	2.3500	.0025327	2.3499016	.0165220
	2.3450	.0027648	2.3448834	.0179712
	2.3400	.0029979	2.3398647	.0194169
	2.3350	.0032322	2.3348425	.02[illegible]
	2.3300	.0034675	2.3298198	.0222975
	2.3250	.0037040	2.3247953	.0237325
	2.3200	.0039415	2.3197697	.0251639
	2.3150	.0041802	2.3147425	.0265626
	2.3100	.0044198	2.3097137	.02801[illegible]6
	2.3050	.0046609	2.3046835	.0294367
	2.3000	.0049030	2.2996517	.0308538
	2.2950	.0051462	2.2946195	.0322673
	2.2900	.0053905	2.2895750	.0336772
	2.2850	.0056360	2.2845476	.0350836
	2.2800	.0058826	2.2795100	.0364863
	2.2750	.0061304	2.2744708	.0378120
	2.2700	.0063794	2.2694302	.0392810
	2.2650	.0066295	2.2643881	.0406725
	2.2600	.0068808	2.2593446	.0420612
	2.2550	.0071333	2.2542997	.0434459
	2.2500	.0073870	2.2492533	.0448270
	2.2450	.0076418	2.2442059	.0462045
	2.2400	.0078979	2.2391561	.0475783
	2.2350	.0081551	2.2341054	.0489485
	2.2300	.0084136	2.2290533	.0503154
	2.2250	.0086733	2.2239997	.0516783
	2.2200	.0089341	2.2189477	.0530376
	2.2150	.0091462	2.213840[illegible]	.0543933
	2.2100	.0094596	2.2088308	.0557453
	2.2050	.0097241	2.2037713	.05709[illegible]
	2.2000	.0099[illegible]99	2.1986466	.0584384
	[illegible].1900	.0105257	2.188[illegible]953	.0[illegible]11108
	[illegible].1800	.0110696	2.178454[illegible]	.0[illegible]37805
	2.1700	.0116109	2.168[illegible]178	.0[illegible]
	2.1600	.0121514	2.15[illegible]17[illegible]	.0690634
	2.1500	.0127171	2.14802[illegible]	.0718[illegible]
	2.1400	.0132780	2.1378[illegible]7	.0742[illegible]

Table 2 (Continued)

(h) $M_d = 3.500$

ξ	η	x	y
2.1300	.0138441	2.1277176	.0768782
2.1200	.0144155	2.1175542	.0794533
2.1100	.0149922	2.1073854	.0820135
2.1000	.0155744	2.0972115	.0845588
2.0900	.0161620	2.0870324	.0870891
2.0800	.0167551	2.0768481	.0896045
2.0700	.0173537	2.0666587	.0921049
2.0600	.0179580	2.0564643	.0945900
2.0500	.0185679	2.0462649	.0970602
2.0400	.0191835	2.0360603	.0995152
2.0300	.0198048	2.0258511	.1019554
2.0200	.0204320	2.0156369	.1043797
2.0100	.0210651	2.0054179	.1067891
2.0000	.0217040	1.9951941	.1091836
1.9900	.0223490	1.9849656	.1115622
1.9800	.0230000	1.9747324	.1139256
1.9700	.0236570	1.9644946	.1162739
1.9600	.0243203	1.9542523	.1186067
1.9500	.0249897	1.9440054	.1209241
1.9400	.0256654	1.9337541	.1232260
1.9300	.0263475	1.9234983	.1255123
1.9200	.0270359	1.9132383	.1277832
1.9100	.0277308	1.9029739	.1300385
1.9000	.0284323	1.8927060	.1322781
1.8900	.0291403	1.8824326	.1345022
1.8800	.0298549	1.8721557	.1367106
1.8700	.0305763	1.8618748	.1389033
1.8600	.0313045	1.8515900	.1410803
1.8500	.0320395	1.8413012	.1432415
1.8400	.0327814	1.8310086	.1453870
1.8300	.0335304	1.8207121	.1475166
1.8200	.0342863	1.8104120	.1496305
1.8100	.0350495	1.8001083	.1517284
1.8000	.0358198	1.7898009	.1538105
1.7900	.0365974	1.7794901	.1558766
1.7800	.0373524	1.7691758	[illegible]
1.7700	.0381747	[illegible]	[illegible]
1.7600	.0389746	1.7485373	[illegible]
1.7500	[illegible]	[illegible]	[illegible]
1.7400	[illegible]	[illegible]	[illegible]
1.7300	[illegible]	[illegible]	[illegible]
1.7200	.0422510	[illegible]	[illegible]
1.7100	[illegible]	[illegible]	[illegible]
1.7000	[illegible]	[illegible]	[illegible]
1.6900	[illegible]	[illegible]	[illegible]
1.6800	[illegible]	[illegible]	[illegible]
1.6700	[illegible]	[illegible]	[illegible]
1.6600	.0474047	[illegible]	[illegible]
1.6500	[illegible]	[illegible]	[illegible]

Table 2 (Continued)

(h) M_d = 3.500

ξ	η	x	y
1.6400	.0491892	1.6244595	.1849474
1.6300	.0500944	1.6141037	.1867568
1.6200	.0510084	1.6037449	.1885503
1.6100	.0519311	1.5933844	.1903276
1.6000	.0528629	1.5830221	.192[illegible]
1.5900	.0538036	1.5726579	.1938341
1.5800	.0547535	1.562291[illegible]	.195[illegible]33
1.5700	.0557127	1.5519242	.1974495
1.5600	.0566813	1.5415550	.1989739
1.5500	.0576597	1.5311843	.2006552
1.5400	.0586470	1.5208122	.2023207
1.5300	.0596443	1.5104387	.2039703
1.5200	.0606515	1.5000641	.2056041
1.5100	.0616686	1.4896884	.2072221
1.5000	.0626958	1.4793116	.208824[illegible]
1.4900	.0637333	1.4689339	.2104111
1.4800	.0647810	1.4585554	.2119822
1.4700	.0658392	1.4481764	.2135378
1.4600	.0669081	1.4377963	.2150779
1.4500	.0679876	1.4274159	.2166027
1.4400	.0690781	1.4170350	.2181121
1.4300	.0701795	1.4066538	.2196064
1.4200	.0712921	1.3962724	.2210856
1.4100	0724161	1.3858907	.2225497
1.4000	.0735515	1.3755090	.2239984
1.3900	.0746985	1.3651274	.2254334
1.3800	.0758573	1.3547459	.2268532
1.3700	.0770280	1.3443646	.2282584
1.3600	.0782109	1.333[illegible]836	.2296492
1.3500	.0794060	1.3236010	.2310257
1.3400	.0806136	1.3132229	.2323681
1.3300	.0818338	1.3028431	.23[illegible]736[illegible]
1.3200	.0830668	1.2924646	.235071[illegible]
1.3100	.0843127	1.2820866	.236[illegible]021
1.3000	.0855719	1.2717095	.237[illegible]
1.2900	.0868444	1.26133[illegible]3	[illegible]
1.2800	.0881305	1.2509[illegible]	[illegible]
1.2700	.0894304	1.2[illegible]	[illegible]
1.2600	.0907442	[illegible]	[illegible]
1.2500	.0920722	1.21984[illegible]	[illegible]
1.2400	.093414[illegible]	1.209[illegible]	[illegible]
1.2300	.0947716	1.199[illegible]	[illegible]
1.2200	0961434	1.188[illegible]	[illegible]
1.2100	.097530[illegible]	1.178[illegible]	[illegible]
1.2000	.098[illegible]	1.168[illegible]	[illegible]
1.1900	.100[illegible]	1.1576[illegible]	[illegible]
1.1[illegible]00	1017[illegible]	[illegible]	[illegible]
1.1700	.10[illegible]131	[illegible]	[illegible]
1.16[illegible]	.104[illegible]	[illegible]	[illegible]

Table 2 (Concluded)

(h) M_2 = 3.500

ξ	η	x	y
1.1500	.1061611	1.1162164	.25[illegible]377
1.1400	.1076802	1.1058650	.2[illegible]6[illegible]
1.1300	.1091963	1.09551[illegible]8	.2580730
1.1200	.1107298	1.0851691	.2591772
1.1100	.1122808	1.0748000	.2602729
1.1000	.1138498	1.0644[illegible]	.261[illegible]
1.0900	.1154369	1.054143[illegible]	.2624[illegible]
1.0800	.1170425	1.0438073	.26[illegible]122
1.0700	.1186669	1.03[illegible]473[illegible]	.26[illegible]77[illegible]
1.0600	.1203101	1.0231426	.2[illegible]
1.0500	.121[illegible]732	1.0128141	.26[illegible]
1.0400	.1236[illegible]58	1.0024[illegible]	.2677146
1.0300	.125[illegible]584	.9921676	.2[illegible]
1.0200	.127[illegible]	.9818487	.2698118
1.0100	.1288251	.971533[illegible]	.2708[illegible]

Table 3

Coefficients in Series Expansions for x, y, θ, and q/$\bar{q}$

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\bar{M}$	$\bar{M}^2$
-.0050	.99453113	.98909217
-.0100	.98907910	.97827747
-.0150	.98364406	.96755564
-.0200	.97822618	.95692046
-.0250	.97282561	.94638067
-.0300	.96744251	.93594501
-.0350	.96207877	.92559956
-.0400	.95672979	.91533189
-.0450	.95140134	.90516451
-.0500	.94608827	.89508301
-.0600	.93552071	.87519900
-.0650	.93026423	.86539154
-.0550	.94079449	.88509427
-.0700	.92502529	.85567179
-.0750	.91980692	.84604477
-.0800	.91460675	.83650459
-.0850	.90942471	.82705330
-.0900	.90426325	.81769203
-.0950	.89912033	.80841737
-.1000	.89399699	.79923062
-.1050	.88889349	.79013164
-.1100	.88380944	.78111913
-.1150	.87874525	.77219321
-.1200	.87370052	.76335260
-.1250	.86867628	.75459848
-.1300	.86367208	.74592943
-.1350	.85868859	.73734609
-.1400	.85372497	.72884632
-.1450	.84873207	.72043092
-.1500	.84385929	.71209850
-.1550	.83895731	.70384937
-.1600	.83407609	.6[illegible]
-.1650	.82921575	.6[illegible]76
-.1700	.8243763[illegible]	.679596[illegible]
-.1750	.81955743	.67167[illegible]
-.1800	.81476062	.66[illegible]87
-.1850	.80[illegible]	.65[illegible]7502
-.1900	.80522969	.64[illegible]39485
-.1950	.80049574	.640[illegible]
-.2000	.79578387	.63327197
-.2050	.79109294	.62[illegible]04
-.2100	.78642[illegible]	.61846[illegible]00
-.[illegible]150	.78177602	.6[illegible]1117[illegible]
-.2200	.77714999	.6[illegible]39[illegible]11
-.2250	.772[illegible]	.60[illegible]
-.2300	.767[illegible]	.[illegible]703
-.2350	.7[illegible]	.59[illegible]
-.2400	.7[illegible]	.57[illegible]
-.2450	.754[illegible]	[illegible]

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
-.2500	.74835150	.56227727
-.2550	.74537853	.55558915
-.2600	.74097739	.54837334
-.2650	.73649847	.54243000
-.2700	.73209164	.53595617
-.2750	.72770698	.52955745
-.2800	.72334431	.52327609
-.2850	.71900391	.51696662
-.2900	.71468582	.51077582
-.2950	.71038485	.50465374
-.3000	.70611627	.49860012
-.3050	.70186482	.49261423
.3100	.69763577	.48669567
-.3150	.69342875	.48084343
-.3200	.68924429	.47505769
-.3250	.68508205	.46933742
-.3300	.68094203	.46368205
-.3350	.67682441	.45809128
-.3400	.67272900	.45256431
-.3450	66865590	.44710083
-.3500	.66460513	.44169998
-.3550	.66057674	.43616163
-3600	.65657043	.4310[illegible]
-.3650	.65258652	.42586917
-.3700	.64862472	.42071403
-.3750	.64468542	.41561903
-.3800	.64076792	.41058353
-.3850	.63687208	.40560081
-.3900	.63299970	40068862
-.39[illegible]	.62[illegible]14[illegible]	.39582[illegible]28
-.4000	.62[illegible]013	.3910[illegible]6
-.4100	.61772864	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Table 3 (Continued)

(a) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
-.5900	.49571204	.24575026
-.6000	.48973562	.23984098
-.6100	.48381775	.23407914
-.6200	.47797634	.22846138
-.6300	.47221210	.22298427
-.6400	.46652383	.21764448
-.6500	.46091084	.21243880
-.6600	.45537229	.20736592
-.6700	.44990757	.20241682
-.6800	.44451552	.19759431
-.6900	.43919633	.19289342
-.7000	.43394833	.18831115
-.7100	.42877[illegible]09	.18384465
-.7200	.42366375	.17949097
-.7300	.4186[illegible]	.17524738
-.7400	.41365584	.17111115
-.7500	.40875370	.16707959
-.7600	.40391838	.16315006
-.7700	.39914911	.15932001
-.7800	.39444507	.155[illegible]
-.7900	.38980554	.15194836
-.8000	.38522969	.14840191
-.8100	.38071674	.14494574
-.8200	.37626594	.14157606
-.8300	.37187616	.13829210
-.8400	.36754750	.13509[illegible]
-.8500	.36327840	.13197126
[illegible]	[illegible]	.128[illegible]013
[illegible]	[illegible]	.12596581
[illegible]	[illegible]	.12307630
[illegible]	[illegible]	.12025966
[illegible]	[illegible]	.11751400
[illegible]	[illegible]	.1148[illegible]47
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	.10968405
[illegible]	[illegible]	.10720[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
.0050	1.00548550	1.01100110
.0075	1.00823448	1.01653677
.0100	1.01098760	1.02209590
.0125	1.01374473	1.02767838
.0150	1.01650590	1.03328424
.0175	1.01927120	1.0389[illegible]378
.0200	1.02204050	1.04456678
.0225	1.02481366	1.05024304
.0250	1.02759092	1.05594310
.0275	1.03037212	1.06166671
.0300	1.03315721	1.06741382
.0325	1.03594625	1.07318463
.0350	1.03873923	1.07897919
.0375	1.04153600	1.08479724
.0400	1.04433662	1.09063898
.0425	1.04714110	1.09650448
.0450	1.04994937	1.10239368
.0475	1.05276141	1.10830659
.0500	1.05557720	1.11424323
.0525	1.05839672	1.12020362
.0550	1.06121994	1.12618776
.0575	1.06404682	1.13219564
.0600	1.06687740	1.13822739
.0625	1.06971163	1.14428297
.0650	1.07254946	1.15036234
.0675	1.07539087	1.15646552
.0700	1.07823585	1.16259255
.0725	1.08108439	1.16874346
.0750	1.08393645	1.17491823
.0775	1.08679201	1.18111687
.0800	1.08965105	1.18733941
.0825	1.09251353	1.19358581
.0850	1.09537944	1.19985612
.0875	1.09824875	1.20615032
.0900	1.10112146	1.21246847
.0925	1.10399751	1.21881050
.0950	1.10687690	1.22517647
.0975	1.10975959	1.23156635
.1000	1.11264556	1.23798014
.1025	1.11553479	1.24441787
.1050	1.11842726	1.25087954
.1075	1.12132294	1.25736514
.1100	1.12422183	1.26387472
.1125	1.12712387	1.27040822
.1150	1.13002903	1.27696561
.1175	1.13293731	1.28354695
.1200	1.13584870	1.29015227
.1225	1.1387631[illegible]	1.29678147
.1250	1.14168[illegible]1	1.30343462
.1275	1.1446[illegible]	1.31011172

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
.1300	1.14752460	1.3168[illegible]2[illegible]1
.1325	1.15045106	1.32353704
.1350	1.15338046	1.3[illegible]020649
.1375	1.15631277	1.33705922
.1400	1.15924797	1.34385586
.1425	1.16218606	1.3506764[illegible]
.1450	1.16512697	1.35752086
.1475	1.16807071	1.3643891[illegible]
.1500	1.17101722	1.37125133
.1525	1.17396652	1.37819739
.1550	1.17691857	1.38513732
.1575	1.17987331	1.39210103
.1600	1.18283076	1.39908861
.1625	1.18579009	1.40610003
.1650	1.18875364	1.41313522
.1675	1.19171900	1.42019417
.1700	1.19468647	1.42727696
.1725	1.19765752	1.43438354
.1750	1.20063060	1.44151304
.1775	1.20360618	1.44866784
.1800	1.20658426	1.45584558
.1825	1.20956481	1.46304703
.1850	1.21254781	1.[illegible]7027219
.1875	1.21553322	1.47752101
.1900	1.21852107	1.48479348
.1925	1.22151120	1.49208961
.1950	1.22450370	1.49940931
.1975	1.22749852	1.50675262
.2000	1.23049565	1.51411954
.2025	1.23349502	1.52150996
.2050	1.23649664	1.5289[illegible]94
.2075	1.23950048	1.53636144
.2100	1.24250653	1.54382248
.2125	1.24551473	1.55130694
.2150	1.24852506	1.55881483
.2175	1.25153791	1.56634614
.2200	1.2545520[illegible]	1.5739008[illegible]
.2225	1.[illegible]57568[illegible]5	1.58147[illegible]91
.2250	1.26058729	1.[illegible]890[illegible]
.2275	1.[illegible]63[illegible]	1.[illegible]967[illegible]00
.2300	1.2666[illegible]061	[illegible]04[illegible]5310
.2325	1.[illegible]6[illegible]6[illegible]23	1.[illegible]1202440
.2350	1.27268179	1.[illegible]1971[illegible]
.2375	1.[illegible]7[illegible]71027	[illegible]2743[illegible]9
.2400	1.2787406[illegible]3	1.63[illegible]7760
.[illegible]	1.[illegible]17[illegible]	1.64[illegible]4160
.[illegible]	1.[illegible]848[illegible]	1.[illegible]07[illegible]90
.[illegible]	1.[illegible]87[illegible]	1.[illegible]8[illegible]18
.[illegible]	1.[illegible]908[illegible]	[illegible]17[illegible]
.[illegible]	[illegible]	1.[illegible]
.[illegible]	1.[illegible]0117	1.[illegible]10[illegible]

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	M	M^2
.2575	1.30000406	1.69001061
.2600	1.30304869	1.69793589
.2625	1.30609497	1.70588407
.2650	1.30914288	1.71385508
.2675	1.31219242	1.72184895
.2700	1.31524356	1.72986562
.2725	1.31829628	1.73790508
.2750	1.32135053	1.74596722
.2775	1.32440631	1.75405207
.2800	1.32746359	1.76215958
.2825	1.33052234	1.77028970
.2850	1.33358254	1.77844239
.2875	1.33664418	1.78661766
.2900	1.33970720	1.79481550
.2925	1.34277162	1.80303562
.2950	1.34583739	1.81127828
.2975	1.34890448	1.81954330
.3000	1.35197288	1.82783057
.3025	1.35504258	1.83614039
.3050	1.35811352	1.84447233
.3075	1.36118570	1.85282651
.3100	1.364[illegible]10	1.86120289
.3125	1.3673[illegible]	1.86960142
.3150	1.37[illegible]44	1.87[illegible]03
.3175	1.37348634	1.88646473
.3200	1.37[illegible]	1.89[illegible]38
.3225	1.37964346	1.90341608
.3250	1.38[illegible]	1.91[illegible]
.3275	1.38[illegible]87	1.92[illegible]14
.3300	1.38[illegible]	1.92900743
[illegible]	1.[illegible]	1.[illegible]
[illegible]	1.[illegible]	1.[illegible]1774[illegible]
[illegible]	1.[illegible]	1.[illegible]01
[illegible]	1.[illegible]7	1.[illegible]
[illegible]	1.[illegible]	1.[illegible]
.34[illegible]	1.40[illegible]	1.[illegible]77[illegible]
[illegible]	1.[illegible]	1.[illegible]
[illegible]	1.[illegible]	1.[illegible]
[illegible]	1.[illegible]	[illegible]
[illegible]	1.[illegible]	[illegible]
[illegible]	1.[illegible]	[illegible]
[illegible]	1.[illegible]	[illegible]
[illegible]	1.[illegible]	[illegible]
[illegible]	1.[illegible]	[illegible]
[illegible]	1.[illegible]	[illegible]
[illegible]	1.[illegible]	[illegible]
[illegible]	1.[illegible]	[illegible]
[illegible]	1.[illegible]	[illegible]
[illegible]	1.[illegible]	[illegible]
[illegible]	1.[illegible]	[illegible]
[illegible]	1.[illegible]	[illegible]

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\bar{M}$	$\bar{M}^2$
.3850	1.45691098	2.12258960
.3875	1.46001067	2.13163116
.3900	1.46311087	2.14069342
.3925	1.46621154	2.14977628
.3950	1.46931267	2.15887972
.3975	1.47241425	2.16800372
.4000	1.47551626	2.17714812
.4025	1.47861859	2.18631293
.4050	1.48172133	2.19549810
.4075	1.48482443	2.20470359
.4100	1.48792786	2.21392932
.4125	1.49103161	2.22317526
.4150	1.49413564	2.23244131
.4175	1.49723994	2.24172744
.4200	1.50034450	2.25103362
.4225	1.50344929	2.26035977
.4250	1.5065542[illegible]	2.26970580
.4275	1.509[illegible]	2.27907175
.4300	1.51276484	2.28845740
.4325	1.51[illegible]	2.29786295
.4350	1.51897601	2.30728812
.4375	1.52208178	2.31673295
.4400	1.52518761	2.32619731
.4425	1.528[illegible]	2.33568121
.4450	1.53139[illegible]	2.34518461
.4475	[illegible]	2.3[illegible]470741
.4500	[illegible]	2.3[illegible]424956
.4525	[illegible]	2.3[illegible]381100
.4550	[illegible]	2.38339168
[illegible]	[illegible]	2.39[illegible]
.4600	[illegible]	2.40[illegible]
[illegible]	[illegible]	2.41[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	2.431[illegible]
[illegible]	[illegible]	2.4412[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Table 3 (Continued)

(a) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
.5100	1.61211521	2.59891545
.5125	1.61521589	2.60892237
.5150	1.61831613	2.61894710
.5175	1.62141592	2.62898959
.5200	1.62451525	2.63904980
.5225	1.62761411	2.64912769
.5250	1.63071245	2.65922309
.5275	1.63381027	2.66933600
.5300	1.63690757	2.6794663[illegible]
.5325	1.64000431	2.68961414
.5350	1.64310050	2.69977925
.5375	1.64619611	2.70996163
.5400	1.64929112	2.72016120
.5425	1.65238553	2.73037794
.5450	1.65[illegible]47931	2.74061175
.5475	1.65857245	2.75086257
.5500	1.66166494	2.76113037
.5525	1.66475676	2.77141507
.5550	1.66784790	2.78171662
.5575	1.67093835	2.79203497
.5600	1.67402808	2.80237001
.5625	1.67711709	2.81272173
.5650	1.68020536	2.82309005
.5675	1.68329287	2.83347489
.5700	1.68637962	2.84387622
.5725	1.68946558	2.85429395
.5750	1.69255075	2.86472804
.5775	1.69563510	2.87517839
.5800	1.69871864	2.88564502
.5825	1.70180134	2.89612780
.5850	1.70488318	2.90662666
.5875	1.70796417	2.91714161
.5900	1.71104428	2.92767253
.5925	1.71412350	2.93821937
.5950	1.71720181	2.94878206
.5975	1.72027921	2.95936056
.6000	1.7233556[illegible]	2.96995480
.6025	1.7264312[illegible]	2.98056476
.6050	1.72950579	2.9911[illegible]020
.6075	1.73257941	3.0018[illegible]141
.6100	1.73565204	3.0124[illegible]800
.6125	1.73872768	3.02316004
.6150	1.74179431	3.0338474[illegible]
.6175	1.744063[illegible]4	3.04455017
.6200	1.74793253	3.05[illegible]6813
.6225	1.751[illegible]009	3.06600112
.6250	1.75406859	3.07674460
.6275	1.7[illegible]713203	3.08751297
.6300	1.7[illegible]01[illegible]640	3.0[illegible]829137
.6325	1.76325968	3.10[illegible]08470

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M^2}$
.6350	1.76632186	3.11985[illegible]91
.6375	1.76938294	3.13071509
.6400	1.77244288	3.14155376
.6425	1.77550170	3.15240629
.6450	1.77855938	3.16327347
.6475	1.78161591	3.17415525
.6500	1.78467127	3.16505154
.6525	1.78772546	3.19596272
.6550	1.79077845	3.206857[illegible]6
.6575	1.79383026	3.21782700
.6600	1.79688084	3.22878075
.6625	1.79993023	3.23974883
.6650	1.80297837	3.25073100
.6675	1.80602528	3.26172731
.6700	1.80907094	3.27273767
.6725	1.81211534	3.28376201
.6750	1.81515847	3.29480027
[illegible]775	1.81820033	3.30585244
[illegible]800	1.82124090	3.31691842
[illegible]825	1.82428016	3.32799810
[illegible]50	1.82731812	3.33909151
[illegible]75	1.83035476	3.35019855
[illegible]	1.83339008	3.36131919
[illegible]25	1.83642405	3.37245329
[illegible]	1.83945668	3.38360068
[illegible]	1.84248796	3.39476188
[illegible]7000	1.84551788	3.40593625
[illegible]	1.8[illegible]54642	3.41712387
[illegible]	1.95157357	3.4[illegible]832469
.70[illegible]	1.8[illegible]4[illegible]934	3.43953871
[illegible]	.85762371	3.45076585
[illegible]	86064667	3.46200803
[illegible]50	[illegible]5366821	3.47325920
[illegible]75	.86668833	3.484[illegible]253[illegible]
[illegible]200	1.86970701	3.49580430
[illegible]25	1.87272425	3.50709612
[illegible]50	1.87574004	3.51840070
[illegible]75	1.87875437	3.52971798
[illegible]00	1.88176723	3.54104791
[illegible]	1.88477862	3.552[illegible]9045
[illegible]350	1.88778853	3.[illegible]953
[illegible]375	1.89079694	3.57511307
[illegible]00	1.89380386	3.58649306
[illegible]425	1.89680927	3.59788[illegible]
.7450	1.89981[illegible]16	3.60929004
[illegible]	1.9028[illegible]2	3.62070690
.7500	1.9058[illegible]637	3.63213604
[illegible]	1.90881567	3.64357726
.7550	1.[illegible]	3.6[illegible]063
.7575	1.9148[illegible]	3.66649600

Table 3 (Continued)

(a) − [illegible]0200 ≤ ξ ≤ 3.1250

ξ	$\bar{M}$	$\bar{M}^2$
.7600	1.91780430	3.67797333
.7625	1.92079739	3.68946261
.7650	1.92378890	3.70096373
.7675	1.92677884	3.71247670
.7700	1.92976718	3.72400137
.7725	1.93275394	3.73553779
.7750	1.93573910	3.74706586
.7775	1.93872264	3.75864547
.7800	1.94170457	3.77021664
.7825	1.94468489	3.78179932
.7850	1.94766358	3.79339342
.7875	1.95064064	3.80499891
.7900	1.95361605	3.81661567
.7925	1.95658982	3.82824372
.7950	1.95956194	3.83988300
.7975	1.96253240	3.85153342
.8000	1.96550120	3.86319447
.8025	1.96846833	3.87486757
.8050	1.97143379	3.88655119
.8075	1.97439756	3.89824572
.8100	1.97735965	3.90995119
.8125	1.9803200[illegible]	3.92166746
.8150	1.98327874	3.93339456
.8175	1.98623573	3.94513238
.8200	1.98919101	3.95688087
.8225	1.99214458	3.96864003
.8250	1.9950964[illegible]	3.98040976
.8275	1.998046[illegible]	3.9921900[illegible]
.8300	2.0009[illegible]494	4.00398075
.8325	2.00394160	4.015781[illegible]4
.8350	2.00688651	4.02759346
.8375	[illegible].00982968	4.039415[illegible]4
.8400	[illegible].01[illegible]77111	4.0[illegible]124754
.8425	[illegible].01[illegible]71077	4.06308441
.8450	[illegible]	4.07494249
.8475	[illegible]	4.08680514
[illegible]	[illegible]	4.09867791
[illegible]	[illegible]	4.1105[illegible]068
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
.8700	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
.8850	2.06541201	4.26502677
.8875	2.06831930	4.27794473
.8900	2.07122476	4.28897201
.8925	2.07412838	4.30200854
.8950	2.07703015	4.31405424
.8975	2.07993008	4.32610914
.9000	2.08282815	4.33817310
.9025	2.08572437	4.35024615
.9050	2.08861873	4.36232820
.9075	2.09151123	4.37441923
.9100	2.09440186	4.38651915
.9125	2.09729062	4.398627[illegible]4
.9150	2.10017751	4.41074557
.9175	2.10306253	4.42287201
.9200	2.10594567	4.43500716
.9225	2.10882693	4.44715102
.9250	2.11170630	4.45930350
.9275	2.11450378	4.47146456
.9300	2.11745937	4.48363418
.9325	2.12033308	4.49581237
.9350	2.12320488	4.50799896
.9375	2.12607479	4.52019401
.9400	2.12894279	4.53239740
.9425	2.13180889	4.54460914
.9450	2.13467309	4.55682920
.9475	2.13753538	4.56905750
.9500	2.14039575	4.58129397
.9525	2.14325421	4.59353861
.9550	2.14611074	4.60579131
.9575	2.148[illegible]36	4.6180[illegible]12
.9600	2.15181806	4.63032096
.9625	2.154[illegible]4	4.64259781
.9650	2.15[illegible]1768	4.65488254
.9675	2.16036[illegible]	4.66717520
.9700	2.16320960	4.67947577
.9725	2.16605265	4.69178408
[illegible]	2.168[illegible]	4.70410023
[illegible]	2.17173[illegible]	4.71642405
[illegible]	2.17[illegible]	4.72875[illegible]55
[illegible]	2.1[illegible]740550	[illegible]4109471
[illegible]	2.180[illegible]	4.[illegible]344149
[illegible]	2.18[illegible]	4.[illegible]
[illegible]	2.18[illegible]974	4.[illegible]1576[illegible]
[illegible]	[illegible]	4.7[illegible]
[illegible]	[illegible]	4.[illegible]
[illegible]	[illegible]	4.8[illegible]00
1.0000	[illegible]	4.[illegible]
1.00[illegible]	[illegible]	4.[illegible]
1.[illegible]	[illegible]	[illegible]
1.[illegible]	[illegible]	4.[illegible]

Table 3 (Continued)

(a) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
1.0100	2.20846519	4.87731050
1.0125	2.21127706	4.88974624
1.0150	2.21408637	4.90218111
1.0175	2.21689491	4.91462304
1.0200	2.21970088	4.92707200
1.0225	2.22250489	4.93952799
1.0250	2.22530693	4.95199093
1.0275	2.22810701	4.96446085
1.0300	2.23090510	4.97693757
1.0325	2.23370123	4.98942[illegible]18
1.0350	2.23649538	5.00191158
1.0375	2.23928756	5.01440878
1.0400	2.24207776	5.02691268
1.0425	2.24486598	5.03942327
1.0450	2.24765223	5.05194055
1.0475	2.25043650	5.06446444
1.0500	2.25321879	5.07699492
1.0525	2.25599910	5.08953194
1.0550	2.25877742	5.10207343
1.0575	2.26155376	5.11462541
1.0600	2.26432812	5.12718184
1.0625	2.26710050	5.13974468
1.0650	2.26987089	5.15231386
1.0675	2.27263930	5.16488939
1.0700	2.27540571	5.17747115
1.0725	2.27817015	5.19005923
1.0750	2.28093259	5.20265348
1.0775	2.28369305	5.21525395
1.0800	2.28645151	5.22786051
1.0825	2.28920799	5.24047322
1.0850	2.29196249	5.25309206
1.0875	2.29471498	5.26571684
1.0900	2.29746549	5.27834768
1.0925	2.30021400	5.29098445
1.0950	2.30296053	5.30362720
1.0975	2.30570506	5.31627582
1.1000	2.30844760	5.32893032
1.1025	2.31118815	5.34159066
1.1050	2.31392670	5.35425677
1.1075	2.31666327	5.3[illegible]2071
1.1100	2.3193978[illegible]	5.3[illegible]6[illegible]029
1.1125	2.322130[illegible]1	5.39228964
1.1150	2.32486098	5.40437858
1.1175	2.32758950	5.41707329
1.1200	2.33031616	5.43037341
1.1225	2.33304076	5.44307919
1.1250	2.33576337	5.45579052
1.1275	2.33848398	5.46850732
1.1300	2.3412[illegible]259	5.48122957
1.1325	2.34391921	5.49395726

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	M	M^2
1.1350	2.34663384	5.50669[illegible]8
1.1375	2.34934648	5.51942886
1.1400	2.35205711	5.53217265
1.1425	2.35476577	5.54492183
1.1450	2.35747241	5.55767616
1.1475	2.36017707	5.57043580
1.1500	2.36287974	5.58320067
1.1525	2.36558041	5.59597068
1.1550	2.36827908	5.60874580
1.1575	2.37097577	5.62152610
1.1600	2.37367046	5.63431145
1.1625	2.37636316	5.64710187
1.1650	2.37905387	5.65989732
1.1675	2.38174259	5.67269777
1.1700	2.38442931	5.68550313
1.1725	2.38711404	5.69831344
1.1750	2.38979678	5.71112865
1.1775	2.39247754	5.72394878
1.1800	2.39515631	5.73677375
1.1825	2.39783308	5.74960348
1.1850	2.40050787	5.76243803
1.1875	2.40318067	5.77527733
1.1900	2.40585148	5.78812134
1.1925	2.40852030	5.8009700[illegible]
1.1950	2.41118714	5.81382342
1.1975	2.41385199	5.82668143
1.2000	2.41651486	5.83954407
1.2025	2.41917574	5.85241126
1.2050	2.42183464	5.86528302
1.2075	2.42449155	5.87815928
1.2100	2.42714646	5.89104004
1.2125	2.42979944	5.90392532
1.2150	2.43245040	5.91681495
1.2175	2.43509938	5.92970894
1.2200	2.43774639	5.94260746
1.2225	2.44039143	5.95551033
1.2250	2.44303448	5.96841747
1.2275	2.44567555	5.98132890
1.2300	2.4483146[illegible]	5.994[illegible]463
1.2325	2.45095176	6.00716453
1.2350	2.453586[illegible]	6.[illegible]077
1.23[illegible]	2.45622009	6.03[illegible]0171[illegible]
1.2400	2.45885129	6.04594867
1.24[illegible]	2.46148057	6.058[illegible]613
1.2450	2.46410777	6.07182[illegible]10
1.2475	2.466[illegible]	6.08477194
1.2500	2.46[illegible]35637	6.09772088
1.2525	2.4[illegible]1977[illegible]	6.110673[illegible]
1.2550	2.47459710	6.12361081
1.2575	2.4[illegible]141[illegible]1	6.1[illegible]173

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M^2}$
1.2600	.47982996	6.14955663
1.2625	2.48244345	6.1625[illegible]548
1.[illegible]350	2.48505497	6.17549820
1.2675	2.48766452	6.18847476
1.2700	2.49027212	6.20145523
1.2725	2.49287776	6.21443953
1.2750	2.49548144	6.22742762
1.2775	2.49808316	6.24041947
1.2800	2.50068292	6.25341507
1.2825	2.50328073	6.26641441
1.2850	2.50587658	6.27941743
1.2875	2.50847049	6.29242420
1.2900	2.51106244	6.30543438
1.2925	2.51365243	6.31844854
1.2950	2.51624049	6 33146620
1.2975	2.51882659	6.3444873[illegible]
1.3000	2.52141074	6.3575121[illegible]
1.3025	2.52399295	6.37054041
1.3050	2.52657321	6.38357219
1.3075	2.52915153	6.39660746
1.3100	2.53172791	6.40964621
1.3125	2.53430235	6.42268840
1.3150	2.53687484	6.43573[illegible]95
1.3175	2.53944540	6.4487829[illegible]
1 3200	2.54201402	6.46183528
1.3225	2.54458072	6 47489104
1.3250	2.54714547	6.48795005
1.3275	2.54970828	6.50101231
1.3300	2.55226918	6.51407797
1.3325	2.55482814	6.52714602
1.3350	2.55738517	6.54021891
1.3375	2.55994027	6.55329419
1.3400	2.56249345	6.56637268
1.3425	2.56504470	6.57945431
1.3450	2.56759403	6.59253910
1.3475	2.57014144	6.60562702
1.3500	2.5726869[illegible]	6.61871804
1.3525	2.57523050	6.63181213
1.3550	2.57777216	6.6[illegible]1909[illegible]
1.3575	2.580311[illegible]	6.6[illegible]
1.360	2.5828497[illegible]	6.67[illegible]1273
1.36[illegible]	2.585[illegible]8554	6.68421891
1.3[illegible]50	2.58791964	[illegible].69[illegible]32806
1.3675	2.5904517[illegible]	6 71044017
1.3700	2.5[illegible]98192	6.72[illegible]
1.372[illegible]	2.59[illegible]51020	6.7[illegible]67320
1.375	2.59[illegible]	6.7[illegible]79407
1 377	2.60056105	6.76[illegible]91777
1.3800	2.60308362	6.[illegible]76[illegible]433
1.38[illegible]	2.60[illegible]60430	6.[illegible]8917377

Table 3 (Continued)

(a) $1.0200 \leq \xi \leq 1.1750$

ξ	$\overline{M}$	$\overline{M}^2$
1.3850	2.60812307	6.80230595
1.3875	2.61063994	6.81544090
1.3900	2.61315492	6.82857864
1.3925	2.61566800	6.84171909
1.3950	2.61817920	6.85486232
1.3975	2.62068851	6.86800827
1.4000	2.62319592	6.88115683
1.4025	2.62570145	6.89430610
1.4050	2.62820510	6.90746205
1.4075	2.63070686	6.92061858
1.4100	2.63320674	6.93377774
1.4125	2.63570474	6.94693948
1.4150	2.63820086	6.96010378
1.4175	2.64069510	6.97327061
1.4200	2.64318747	6.98644000
1.4225	2.64567797	6.99961192
1.4250	2.64816659	7.01278629
1.4275	2.65065334	7.02596313
1.4300	2.65313823	7.03914247
1.4325	2.65562124	7.05232417
1.4350	2.65810240	7.06550837
1.4375	2.66058169	7.07869493
1.4400	2.66305912	7.09188388
1.4425	2.66553469	7.10507518
1.4450	2.66800840	7.11826882
1.4475	2.67048026	7.13146482
1.4500	2.67295026	7.14466309
1.4525	2.67541842	7.15786372
1.4550	2.67788471	7.17106652
1.4575	2.68034917	7.18427167
1.4600	2.68281177	7.19747899
1.4625	2.68527253	7.21068856
1.4650	2.68773144	7.22390029
1.4675	2.69018852	7.23711427
1.4700	2.69264375	7.25033036
1.4725	2.69509715	7.26354865
1.4750	2.69754870	7.27676899
1.4775	2.69999[illegible]	7.2[illegible]
1.4800	2.7024[illegible]	[illegible]
1.4825	2.7044[illegible]	7.31641284
1.4850	2.707[illegible]	[illegible]
1.4875	2.70977903	[illegible]
1.4900	[illegible]	[illegible]
1.4925	2.714[illegible]	[illegible]
1.4950	[illegible]	[illegible]
1.4975	[illegible]	[illegible]
1.5000	2.72[illegible]	[illegible]
1.5025	[illegible]	[illegible]
1.5050	[illegible]	[illegible]
1.5075	[illegible]	[illegible]

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
1.5100	2.73167881	7.46206912
1.5125	2.73410305	7.47531949
1.5150	2.73652549	7.48857176
1.5175	2.73894612	7.50182585
1.5200	2.74136495	7.51508179
1.5225	2.74378198	7.52833955
1.5250	2.74619721	7.54159912
1.5275	2.74861066	7.55486056
1.5300	2.75102229	7.56812364
1.5325	2.75343214	7.581388[illegible]5
1.5350	2.75584020	7.59465521
1.5375	2.75824646	7.60792353
1.5400	2.76065095	7.62119367
1.5425	2.76305364	7.63446542
1.5450	2.76545456	7.64773892
1.5475	2.76785369	7.66101405
1.5500	2.77025105	7.67429088
1.5525	2.77264663	7.68756933
1.5550	2.77504043	7.70084939
1.5575	2.77743246	7.71413107
1.5600	2.77982272	7.72741435
1.5625	2.78221121	7.74069922
1.5650	2.78459793	7.75398563
1.5675	2.78698288	7.76727357
1.5700	2.78936608	7.78056313
1.5725	2.79174751	7.79385416
1.5750	2.79412718	7.80714670
1.5775	2.79650510	7.82044077
1.5800	2.79888125	7.83373625
1.5825	2.80125567	7.84703333
1.5850	2.80362832	7.86033176
1.5875	2.80599923	7.87363158
1.5900	2.80836878	7.88693296
1.5925	2.810735[illegible]0	7.90023574
1.5950	2.813101[illegible]7	7.9135398[illegible]
1.5975	2.81546539	7.92684536
1.6000	2.81782758	7.94015227
1.6025	2.82018803	7.95346052
1.6050	2.82254675	7.96677016
1.6075	2.82490374	7.98008114
1.6100	2.82725898	7.99339334
1.6125	2.82961200	8.00[illegible]08[illegible]0
1.6150	2.83196430	8.02002180
1.6175	2.83431437	8.03[illegible]795
1.6200	2.83666272	8.04665[illegible]9
1.6225	2.83900934	8.0[illegible]7403
1.6250	2.84135421	8.07[illegible]397
1.6275	2.84369743	8.08661[illegible]07
1.6300	2.84603891	8.09[illegible]3748
1.6325	2.84837867	8.11[illegible]6103

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
1.6350	2.85071671	8.12658576
1.6375	2.85305303	8.13991171
1.6400	2.85538768	8.15323880
1.6425	2.85772061	8.16656708
1.6450	2.86005183	8.17989647
1.6475	2.86238135	8.19322699
1.6500	2.86470918	8.20655869
1.6525	2.86703530	8.21989141
1.6550	2.86935973	8.23322546
1.6575	2.87168247	8.24656021
1.6600	2.87400351	8.25989618
1.6625	2.87632287	8.27323325
1.6650	2.87864054	8.28657136
1.6675	2.88095653	8.29991053
1.6700	2.88327084	8.31325074
1.6725	2.88558346	8.32659190
1.6750	2.88789440	8.33993407
1.6775	2.89020366	8.35327720
1.6800	2.89251126	8.36662139
1.6825	2.89481718	8.37996651
1.6850	2.89712143	8.39331258
1.6875	2.89942400	8.40665953
1.6900	2.90172492	8.42000751
1.6925	2.90402417	8.43335638
1.6950	2.90632176	8.44670617
1.6975	2.90861768	8.46005681
1.7000	2.91091195	8.47348 8
1.7025	2.91320455	8.48676075
1.7050	2.91549551	8.50011407
1.7075	2.91778482	8.51346826
1.7100	2.92007247	8.52682323
1.7125	2.92235847	8.54017903
1.7150	2.92464283	8.55353568
1.7175	2.92692555	8.56689318
1.7200	2.92920663	8.58025148
1.7225	2.93148606	8.59361052
1.7250	2.93376386	8.60697039
1.7275	2.93604001	8.62033094
1.7300	2.93831452	8.63369228
1.7325	2.94058743	8.64705443
1.7350	2.94285869	8.66041727
1.7375	2.94512833	8.67378088
1.7400	2.94739634	8.68714519
1.7425	2.94966272	8.70051016
1.7450	2.95192748	8.71387565
1.7475	2.95419063	8.72724228
1.7500	2.95645215	8.74060812
1.7525	2.95871207	8.75397711
1.7550	2.96097037	8.76734553
1.7575	2.96322706	8.78071455

le 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	[illegible]
1.7600	2.96548212	8.79408420
1.7625	2.96773559	8.80745453
1.7650	2.96998745	8.82082545
1.7675	2.97223771	8.83419700
1.7700	2.97446637	8.84756917
1.7725	2.97673343	8.86094191
1.7750	2.97897889	8.87431523
1.7775	2.98122275	8.88768909
1.7800	2.98346503	8.90106359
1.7825	2.98570571	8.91443859
1.7850	2.98794480	8.92781413
1.7875	2.99018230	8.94119019
1.7900	2.99241822	8.95456830
1.7925	2.99465255	8.96794390
1.7950	2.99688531	8.98132156
1.7975	2.99911648	8.99469966
1.8000	3.00134608	9.00807829
1.8025	3.00357410	9.02145737
1.8050	3.00580055	9.03483695
1.8075	3.00802543	9.04821699
1.8100	3.01024874	9.06159748
1.8125	3.01247048	9.07497839
1.8150	3.01469065	9.08835972
1.8175	3.01690927	9.10174154
1.8200	3.01912632	9.11512374
1.8225	3.02134181	9.12850633
1.8250	3.02355578	9.14188955
1.8275	3.02576819	9.15527314
1.8300	3.02797904	9.16865707
1.8325	3.03018833	9.18204132
1.8350	3.03239606	9.19542586
1.8375	3.03460224	9.20881076
1.8400	3.03680687	9.22219597
1.8425	3.03900995	9.23558148
1.8450	3.04121146	9.24896727
1.8475	3.04341147	9.26235335
1.8500	3.04560992	9.27573970
1.8525	3.0478[illegible]	9.28[illegible]12650
1.8550	3.05000275	9.30[illegible]5137[illegible]
1.8575	3.0521[illegible]12	9.31590115
1.8600	3.05438846	9.32928886
1.8625	3.05657920	9.34267689
1.8650	3.05876858	9.35606[illegible]23
1.8675	3.06095[illegible]	9.36945396
1.8700	3.06314263	9.38[illegible]8427[illegible]
1.8725	3.06[illegible]12730	9.39623182
1.8750	3.06751058	9.40962116
1.8775	3.06969227	9.42301063
1.8800	3.07187246	9.43640041
1.8825	3.07405[illegible]	9.44979[illegible]

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M}'$
1.8850	3.07622930	9.46318055
1.8875	3.07840395	9.47657088
1.8900	3.08057811	9.48996149
1.8925	3.08275076	9.50335225
1.8950	3.08492191	9.51674319
1.8975	3.08709156	9.53013430
1.9000	3.08925971	9.54352556
1.9025	3.09142637	9.55691700
1.9050	3.09359153	9.57030855
1.9075	3.09575520	9.58370026
1.9100	3.09791737	9.59709203
1.9125	3.10007807	9.61048404
1.9150	3.10223728	9.62387614
1.9175	3.104395[illegible]	9.63726832
1.9200	3.10655124	9.65066061
1.9225	3.10870601	9.66405306
1.9250	3.11085529	9.67744552
1.9275	3.11301110	9.69083811
1.9300	3.11516143	9.70423073
1.9325	3.11731029	9.71762344
1.9350	3.11945768	9.73101622
1.9375	3.12160361	9.74440910
1.9400	3.12374806	9.75780194
1.9425	3.12589106	9.77119492
1.9450	3.12803258	9.78458782
1.9475	3.13017266	9.79798088
1.9500	3.13231127	9.81137389
1.9525	3.13444842	9.82476690
1.9550	3.13658412	9 83815994
1.9575	3.13871836	9.85155294
1.9600	3.14085117	9.86494607
1.9625	3.1425[illegible]251	9.87833906
1.9650	3.14511241	9.89173207
1.9675	3.14724087	9.90512509
1.9700	3.14936789	9.91851811
1.9725	3.15149345	9.93191097
1.9750	3.15361758	9.94530384
1.9775	3.155740[illegible]0	9.95869671
1.9800	3.15786154	9.97208951
1.9825	3.15998136	9.98548220
1.9850	3.162099[illegible]	99887483
1.9875	3.16421672	10 01226745
1.9900	3.16633225	10.02565992
1.9925	3.16844636	10.03905234
1.9950	3.17055904	10.05244463
1.9975	3.17267030	10.06583683
2.0000	3.17478015	10.07922900
2.0025	3.17688857	10 09262099
2.0050	3.17899558	10.10601290
2.0075	3.18110117	10.11940465

Table 3 (Continued)

(a) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
2.0100	3.18320535	10.13279630
2.0125	3.18530812	10.14618782
2.0150	3.18740947	10.15957913
2.0175	3.18950943	10.17297040
2.0200	3.19160797	10.18636143
2.0225	3.19370512	10.19975239
2.0250	3.19580086	10.21314314
2.0275	3.19789520	10.22653371
2.0300	3.19998814	10.23992410
2.0325	3.20207968	10.25331428
2.0350	3.20416984	10.26670436
2.0375	3.20625860	10.28009421
2.0400	3.20834597	10.29348386
2.0425	3.21043195	10.30687331
2.0450	3.21251655	10.32026258
2.0475	3.21459976	10.33365162
2.0500	3.21668158	10.34704039
2.0525	3.21876203	10.36042901
2.0550	3.22084109	10.37381733
2.0575	3.22291878	10.38720546
2.0600	3.22499510	10.40059340
2.0625	3.22707003	10.41398098
2.0650	3.22914360	10.42736839
2.0675	3.23121580	10.44075555
2.0700	3.23328662	10.45414237
2.0725	3.23535609	10.46752903
2.0750	3.23742418	10.48091532
2.0775	3.23949091	10.49430136
2.0800	3.24155629	10.50768718
2.0825	3.24362030	10.52107265
2.0850	3.24568295	10.53445781
2.0875	3.24774426	10.54784278
2.0900	3.24980420	10.56122734
2.0925	3.25186279	10.57461160
2.0950	3.25392003	10.58799556
2.0975	3.25597593	10.60137926
2.1000	3.25803040	10.61476261
2.1025	3.26008365	10.62814550
2.1050	3.262135[illegible]4	10.64152826
2.1075	3.2641660[illegible]	10.65491063
2.1100	3.266[illegible]	10.668[illegible]
2.1125	3.26828307	10.68167423
2.1150	3.2703235[illegible]	10.69505556
2.1175	3.2723747[illegible]	10.7084365[illegible]
2.1200	3.2744185[illegible]	10.7218171[illegible]
2.1225	3.27[illegible]110	10.735192[illegible]4
2.1250	3.2785022[illegible]	10.74857720
2.1275	3.28054213	10.76[illegible]
2.1300	3.28258065	10.77[illegible]
2.1325	3.28461786	10.7887[illegible]

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{\mathfrak{M}}$
2.1350	3.28665374	10.80209281
2.1375	3.28868830	10.81547073
2.1400	3.29072154	10.82884825
2.1425	3.2927534[illegible]	10.842[illegible]535
2.1450	3.29478408	10.85560213
2.1475	3.29681338	10.86897846
2.1500	3.29884136	10.88235432
2.1525	3.30086804	10.89572982
2.1550	3.30289[illegible]41	10.90910488
2.1575	3.30491748	10.92247955
2.1600	3.30694023	10.93585368
2.1625	3.30896169	10.94922747
2.1650	3.31098185	10.96260081
2.1675	3.31300071	10.97597370
2.1700	3.31501827	10.98934613
2.1725	3.31703453	11.00271807
2.1750	3.31904950	11.01608958
2.1775	3.32106317	11.02946058
2.1800	3.32307557	11.04283124
2.1825	3.32508666	11.05620130
2.1850	3.32709648	11.06957099
2.1875	3.32910500	11.08294010
2.1900	3.33111224	11.09630876
2.1925	3.33311821	11.10967700
2.1950	3.33512289	11.12304469
2.1975	3.33712629	11.13641188
2.2000	3.33912842	11.14977861
2.2025	3.34112927	11.1631448[illegible]
2.2050	3.34312884	11.17651044
2.2075	3.34512715	11.18987565
2.2100	3.34712418	11.20324028
2.2125	3.34911995	11.21660444
2.2150	3.35111445	11.22996806
2.2175	3.35310769	11.24333118
2.2200	3.35509966	11.2566[illegible]
2.2225	3.35709037	11.27005[illegible]
2.2250	3.35907982	11.2834[illegible]724
2.2275	3.36106802	11.[illegible]
2.2300	3.363054[illegible]5	11.[illegible]
2.2325	3.36504063	11.3[illegible]
2.2350	3.3670[illegible]06	11.[illegible]685775
2.2375	3.36900824	11.3[illegible]
2.2400	3.3709901[illegible]	11.36[illegible]
2.2425	3.3729708[illegible]	11.3[illegible]
2.2450	3.37495028	11.[illegible]
2.2475	3.37692846	11.40[illegible]
2.2500	3.37890541	11.417[illegible]177
2.2525	3.38088111	11.4[illegible]
2.2550	3.38285557	11.4[illegible]
2.2575	3.38482880	11.4[illegible]

Table 3 (Continued)

(a) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
2.2600	3.38680078	11.47041952
2.2625	3.38877154	11.48377255
2.2650	3.39074106	11.49712494
2.2675	3.39270934	11.51047667
2.2700	3.39467640	11.52382786
2.2725	3.39664223	11.53717844
2.2750	3.39860683	11.55052838
2.2775	3.40057021	11.56387775
2.2800	3.40253236	11.57722646
2.2825	3.40449329	11.59057456
2.2850	3.40645300	11.60392204
2.2875	3.40841149	11.61726889
2.2900	3.41036877	11.63061515
2.2925	3.41232483	11.64396075
2.2950	3.41427967	11.65730566
2.2975	3.41623331	11.67065003
2.3000	3.41818573	11.68399368
2.3025	3.42013695	11.69733676
2.3050	3.42208695	11.71067909
2.3075	3.42403575	11.72402082
2.3100	3.42598334	11.73736185
2.3125	3.42792974	11.75070230
2.3150	3.42987493	11.76404204
2.3175	3.43181892	11.77738110
2.3200	3.43376172	11.79071955
2.3225	3.43570332	11.80405730
2.3250	3.43764372	11.81739435
2.3275	3.43958292	11.83073066
2.3300	3.44152095	11.84406645
2.3325	3.44345778	11.85740148
2.3350	3.44539342	11.87073502
2.3375	3.44732787	11.88406944
2.3400	3.44926113	11.89740234
2.3425	3.45119327	11.91073464
2.3450	3.45312412	11.92406619
2.3475	3.45505384	11.93739704
2.3500	3.45698238	11.95072718
2.3525	3.45890975	11.96405566
2.3550	3.4608[illegible]3	11.977[illegible]85[illegible]
2.3575	3.46276095	11.99071340
2.3600	3.46468[illegible]79	12.00[illegible]04069
2.3625	3.46660745	12.01[illegible]36721
2.3650	3.46852895	12.03069308
2.3675	3.47044929	12.0440[illegible]
2.3700	3.4723684[illegible]	12.057[illegible]
2.3725	3.47428645	12.070666[illegible]
2.3750	3.47620328	12.08[illegible]
2.3775	3.478118[illegible]	12.09[illegible]1150
2.3800	3.48[illegible]	12.110[illegible]
2.3825	3.48[illegible]	12.1[illegible]

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
2.3850	3.48385901	12.13727360
2.3875	3.48577006	12.15059291
2.3900	3.48767794	12.16391136
2.3925	3.48958867	12.17722909
2.3950	3.49149625	12.19054606
2.3975	3.49340269	12.20386235
2.4000	3.49530796	12.21717774
2.4025	3.49721210	12.23049247
2.4050	3.49911509	12.24380641
2.4075	3.50101693	12.25711954
2.4100	3.50291764	12.27043199
2.4125	3.50481720	12.28374361
2.4150	3.50671562	12.29705444
2.4175	3.50861290	12.31036448
2.4200	3.51050905	12.32367379
2.4225	3.51240406	12.33698228
2.4250	3.51429794	12.35029001
2.4275	3.51619069	12.36359697
2.4300	3.51808230	12.37690307
2.4325	3.51997279	12.39020844
2.4350	3.52186215	12.40351300
2.4375	3.52375038	12.41681674
2.4400	3.52563749	12.43011971
2.4425	3.52752347	12.44342183
2.4450	3.52940833	12.45672316
2.4475	3.53129208	12.47002375
2.4500	3.53317470	12.48332346
2.4525	3.53505621	12.49662241
2.45[illegible]	3.53693659	12.50992041
2.4[illegible]	3.53881587	12.52321776
2.46[illegible]	3.5406940[illegible]	12.53651428
2.4625	3.54257109	12.54980993
2.4650	3.54444702	12.5631[illegible]468
2.4675	3.54632186	12.57639[illegible]3
2.4700	3.54819558	12.5[illegible]
2.4725	3.55006820	12.60298427
2.4750	3.55193971	12.61627570
2.4775	3.55381013	12.629[illegible]044
2.4800	3.55[illegible]41	12.64[illegible]85621
2.4825	3.55734764	12.6[illegible]14521
2.4850	3.5594[illegible]47[illegible]	12.[illegible]
2.4875	3.56128077	12.68[illegible]7207[illegible]
2.4900	3.56314568	12.69600714
2.4925	3.565009[illegible]1	12.70[illegible]
2.4950	3.56687224	12.72[illegible]
2.4975	3.56873[illegible]	12.73[illegible]
2.5000	3.57059[illegible]	12.74914451
2.5025	3.57245[illegible]	12.[illegible]
2.5050	3.574[illegible]1225	12.77[illegible]706[illegible]6
2.5075	3.5[illegible]16954	12.7[illegible]

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
2.5100	3.57802574	12.80226820
2.5125	3.57988086	12.81554697
2.5150	3.58173489	12.82882482
2.5175	3.58358785	12.84210188
2.5200	3.58543977	12.85537799
2.5225	3.58729052	12.86865327
2.5250	3.58914025	12.88192773
2.5275	3.59098889	12.89520121
2.5300	3.59283647	12.90847390
2.5325	3.59468297	12.92174565
2.5350	3.59652841	12.93501660
2.5375	3.59837277	12.94828659
2.5400	3.60021606	12.96155568
2.5425	3.60205829	12.97482392
2.5450	3.60389945	12.98809125
2.5475	3.60573955	13.00135770
2.5500	3.60757859	13.01462328
2.5525	3.60941656	13.02788790
2.5550	3.61125348	13.04115170
2.5575	3.61308934	13.05441458
2.5600	3.61492414	13.06767654
2.5625	3.61675788	13.08093756
2.5650	3.61859057	13.09419771
2.5675	3.62042221	13.10745698
2.5700	3.62225279	13.12071527
2.5725	3.62408233	13.13397273
2.5750	3.62591082	13.14722927
2.5775	3.62773825	13.16048481
2.5800	3.62956465	13.17373955
2.5825	3.63139000	13.18699333
2.5850	3.63321430	13.20024615
2.5875	3.63503757	13.21349814
2.5900	3.63685979	13.22674913
2.5925	3.63868091	13.23999970
2.5950	3.64050111	13.25324813
2.5975	3.64232022	13.26649659
2.6000	3.64413829	13.279743[illegible]
2.6025	3.64595533	13.29[illegible]27
2.6050	3.647771[illegible]	13.30[illegible]
2.6075	3.64958630	13.31948016
2.6100	3.65140[illegible]24	13.3[illegible]
2.6125	3.6532[illegible]316	13.34[illegible]639
2.6150	3.65502[illegible]	13.3[illegible]
2.6175	3.656835[illegible]	13.3[illegible]
2.6200	3.65864574	13.38[illegible]
2.6225	3.66045455	13.[illegible]
2.6250	3.66226[illegible]	13.412[illegible]17
2.6275	3.66406910	13.42[illegible]
2.6300	3.66[illegible]404	13.43[illegible]
2.6325	3.66767497	13.45[illegible]

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\bar{M}$	$\bar{M}_t$
2.6350	3.66948329	13.46510762
2.6375	3.67128598	13.47834075
2.6400	3.67308766	13.49157296
2.6425	3.67488833	13.50480424
2.6450	3.67668798	13.51803450
2.6475	3.67848663	13.53126389
2.6500	3.68028426	13.54449223
2.6525	3.68208089	13.55771968
2.6550	3.68387650	13.57094607
2.6575	3.68567112	13.58417160
2.6600	3.68746473	13.59739613
2.6625	3.68925733	13.61061965
2.6650	3.69104893	13.62384220
2.6675	3.69283953	13.63706379
2.6700	3.69462914	13.65028448
2.6725	3.69641774	13.66350411
2.6750	3.69820535	13.67672281
2.6775	3.69999196	13.68994050
2.6800	3.70177758	13.70315725
2.6825	3.70356220	13.71637297
2.6850	3.70534583	13.72958772
2.6875	3.70712846	13.74280157
2.6900	3.70891013	13.75601435
2.6925	3.71069079	13.76922614
2.6950	3.71247047	13.78243[illegible]99
2.6975	3.71424917	13.79564690
2.7000	3.71602687	13.80885570
2.7025	3.71780360	13.82206361
2.7050	3.71957934	13.83527047
2.7075	3.72135410	13.[illegible]4847634
2.7100	3.72312786	13.86168121
2.7125	3.72490069	13.87488515
2.7150	3.72667251	13.88808800
2.7175	3.72844336	13.90128[illegible]
2.7200	3.73021324	13.91449082
2.7225	3.73198214	13.9276908[illegible]
2.7250	3.73375008	13.940[illegible]66
2.7275	3.73551704	13.954[illegible]8748
2.7300	3.73728307	13.9[illegible]
2.7325	3.73904804	13.98[illegible]480[illegible]
2.7350	3.7408[illegible]210	13.9[illegible]
2.7375	3.7425751[illegible]	[illegible]4.00[illegible]
2.7400	3.744337[illegible]	[illegible]4.02[illegible]
2.7425	3.74609847	14.03[illegible]
2.7450	3.74785866	14.04[illegible]
2.7475	3.749617[illegible]0	14.[illegible]
2.7500	3.75137618	14.07[illegible]
2.7525	3.7531[illegible]340	[illegible]4.0860[illegible]
2.7550	3.75488[illegible]	[illegible]4.09[illegible]
2.7575	3.7566[illegible]	14.11[illegible]

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M}^2$
2.7600	3.75839970	14.12556830
2.7625	3.76015319	14.13875201
2.7650	3.76190573	14.15193472
2.7675	3.76365731	14.16511633
2.7700	3.76540795	14.17829762
2.7725	3.76715764	14.19147668
2.7750	3.76890638	14.20465530
2.7775	3.77065417	14.21783287
2.7800	3.77240102	14.23100946
2.7825	3.77414692	14.24418497
2.7850	3.77589188	14.25735949
2.7875	3.77763589	14.27053292
2.7900	3.77937897	14.28370540
2.7925	3.78112110	14.29687677
2.7950	3.78286229	14.31004711
2.7975	3.78460255	14.32321646
2.8000	3.78634187	14.33638476
2.8025	3.78808026	14.34955206
2.8050	3.78981771	14.36271828
2.8075	3.79155422	14.37588340
2.8100	3.79328981	14.38904758
2.8125	3.79502446	14.40221065
2.8150	3.79675818	14.41537268
2.8175	3.79849099	14.42853380
2.8200	3.80022285	14.44169371
2.8225	3.80195380	14.45485270
2.8250	3.80368381	14.46801053
2.8275	3.80541291	14.48116742
2.8300	3.80714108	14.49432320
2.8325	3.80886833	14.50747796
2.8350	3.81059466	14.52063166
2.8375	3.81232006	14.53378424
2.8400	3.81404456	14.54693591
2.8425	3.81576813	14.56008647
2.8450	3.81749079	14.57323593
2.8475	3.81921252	14.58638427
2.8500	3.82093335	14.59953167
2.8525	3.82265327	14.61[illegible]
2.8550	3.824[illegible]	14.6[illegible]
2.8575	3.82609036	14.63896744
2.8600	3.82780755	14.65211064
2.8625	3.82952382	14.66525269
2.8650	3.83123919	14.6783937[illegible]
2.8675	3.83295366	14.69153376
2.8700	3.83466721	14.7046[illegible]
2.8725	3.83637986	14.71[illegible]
2.8750	3.83809161	14.7[illegible]4721
2.8775	3.83980246	14.74[illegible]
2.8800	3.84151241	14.7[illegible]
2.8825	3.84322145	14.77[illegible]111

Table 3 (Continued)

(a) $-1.0200 \leq \xi \leq 3.1250$

ξ	$\overline{M}$	$\overline{M}$
2.8850	3.84492960	14.78348363
2.8875	3.84663686	14.79661513
2.8900	3.84834321	14.80974546
2.8925	3.85004868	14.822874[illegible]
2.8950	3.85175324	14.83600302
2.8975	3.85345692	14.84913023
2.9000	3.85515969	14.86225624
2.9025	3.85686159	14.87538132
2.9050	3.85856259	14.88850526
2.9075	3.86026271	14.90162819
2.9100	3.86196193	14.91474995
2.9125	3.86366027	14.92787068
2.9150	3.86535772	14.94099030
2.9175	3.86705430	14.95410896
2.9200	3.86874997	14.96722633
2.9225	3.87044478	14.98034280
2.9250	3.87213870	14.99345811
2.9275	3.87383174	15.00657235
2.9300	3.87552391	15.01968558
2.9325	3.87721519	15.03279763
2.9350	3.87890560	15.04[illegible]
2.9375	3.88059513	15.05901856
2.9400	3.88228379	15.07212743
2.9425	3.88397157	15.08523516
2.9450	3.88565848	15.09834182
2.9475	3.88734452	15.11144742
2.9500	3.88902969	15.12455193
2.9525	3.89071399	15.13765535
2.9550	3.89239742	15.15075768
2.9575	3.89407998	15.16385809
2.9600	3.89576168	15.176[illegible]907
2.9625	3.89744251	15.19005812
2.9650	3.89912247	15.20315604
2.9675	3.90080158	15.216[illegible]297
2.9700	3.90247982	15.22934875
2.9725	3.90415719	15.24244336
2.9750	3.90583372	15.2555[illegible]
2.9775	3.907509[illegible]7	15.268[illegible]946
2.9800	3.90918418	15.28172[illegible]
2.9825	3.910858[illegible]	15.29[illegible]1123
2.9850	3.91253121	15.30790047
2.9875	3.91420344	1[illegible].32098[illegible]
2.9900	3.91587[illegible]	1[illegible].31407[illegible]
2.9925	3.91754534	15.3471[illegible]
2.9950	3.91921502	1[illegible].3[illegible]
2.9975	3.92088384	1[illegible].[illegible]
3.0000	3.92255179	1[illegible].3[illegible]
3.0025	3.92421891	15.3[illegible]
3.0050	3.9258[illegible]19	15.4[illegible]
3.0075	3.92[illegible]	1[illegible].4[illegible]

Table 3 (Continued)

(a) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$\overline{M}$	$\overline{M^2}$
3.0100	3.92921521	15.43873217
3.0125	3.93087696	15.45180940
3.0150	3.93254185	15.46488540
3.0175	3.93420390	15.47796033
3.0200	3.93586511	15.49103416
3.0225	3.93752548	15.50410691
3.0250	3.93918499	15.51717839
3.0275	3.94084367	15.53024863
3.0300	3.94250152	15.54331824
3.0325	3.94415854	15.55638659
3.0350	3.94581471	15.56945373
3.0375	3.94747007	15.58251995
3.0400	3.94912458	15.59558495
3.0425	3.95077824	15.6086[illegible]870
3.0450	3.95243107	15.62171136
3.0475	3.95408308	15.63477300
3.0500	3.95573428	15.64783369
3.0525	3.95738465	15.6608933
3.0550	3.95903418	15.67[illegible]95164
3.0575	3.96068285	15.68700864
3.0600	3.9623[illegible]070	15.70006458
3.0625	3.96397775	15.71311960
3.0650	3.96562397	15.72617347
3.0675	3.96726939	15.73922641
3.0700	3.96891396	15.75227802
3.0725	3.97055771	15.76532853
3.0750	3.9722006[illegible]	15.778[illegible]7784
3.0775	3.97384274	15.79142612
3.0800	3.97548404	15.80447[illegible]
3.0825	3.97712451	15.81751937
3.0850	3.97876418	15.83056440
3.0875	3.98040302	15.8[illegible]60820
3.0900	3.98204103	15.8[illegible]65078
3.0925	3.98367825	15.86969240
3.0950	3.98531468	15.8[illegible]273310
3.0975	3.98695028	15.89577[illegible]
3.1000	3.98858504	15.900[illegible]
3.1025	3.99021[illegible]00	15.9[illegible]
3.1050	3.991852[illegible]	15.9[illegible]
3.1075	3.9934[illegible]52	15.9[illegible]
3.1100	3.99511605	15.9[illegible]225
3.1125	3.99674679	15.9739[illegible]440
3.1150	3.998[illegible]7675	15.9870[illegible]
3.1175	4.00000588	16.0000[illegible]
3.1200	4.00163420	16.01307627
3.1225	4.00326171	16.0[illegible]6104[illegible]
3.1250	4.00488841	16.0[illegible]

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1 (= \delta_2)$	y_2
- .01	1.000225	- .0109696
- .02	1.000400	- .0146361
- .0250	1.000625	- .0183093
- .0300	1.000900	- .0219906
- .0350	1.001225	- .0256799
- .0400	1.001600	- .0293814
- .0450	1.002025	- .0330927
- .0500	1.002500	- .0368182
- .0550	1.003025	- .0405567
- .0600	1.003600	- .0443090
- .0650	1.004225	- .0480740
- .0700	1.004900	- .0518647
- .0750	1.005625	- .0556684
- .0800	1.006400	- .0594922
- .0850	1.007225	- .0633364
- .0900	1.008100	- .0672015
- .0950	1.009025	- .0710897
- .1000	1.010000	- .0750016
- .1050	1.011025	- .0789381
- .1100	1.012100	- .0829008
- .1150	1.013225	- .0868906
- .1200	1.014400	- .0909088
- .1250	1.015625	- .0949561
- .1300	1.016900	- .0990339
- .1350	1.018225	- .1031430
- .1400	1.019600	- .1072851
- .1450	1.021025	- .1114609
- .1500	1.022500	- .1156717
- .1550	1.024025	- .1199186
- .1600	1.025600	- .1242027
- .1650	1.027225	- .1285[illegible]
- .1700	1.028900	- .1328870
- .1750	1.030625	- .1372894
- .1800	1.032400	- .1417336
- .1850	1.034225	- .1462207
- .1900	1.036100	- .1507519
- .1950	1.038025	- .155[illegible]
- .2000	1.040000	- .1599[illegible]
- .2050	1.042025	- .164[illegible]
- .2100	1.044100	- .169[illegible]
- .2150	1.046225	- .1741[illegible]
- .2200	1.048400	- .[illegible]789290
- .2250	1.050625	- [illegible]
- .2300	1.052900	- [illegible]
- .2350	1.055225	- [illegible]
- .2400	1.057600	- [illegible]
- .2450	1.060025	- [illegible]
- .2500	1.062500	- [illegible]
.2550	1.065025	- [illegible]

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
-.2600	1.067600	-.2194686
-.2650	1.070225	-.2245017
-.2700	1.072900	-.2301980
-.2750	1.075625	-.2356586
-.2800	1.078400	-.2411848
-.2850	1.081225	-.2467779
-.2900	1.084100	-.2524391
-.2950	1.087025	-.2581698
-.3000	1.090000	-.2639710
-.3050	1.093025	-.2698413
-.3100	1.096100	-.2757907
-.3150	1.099225	-.2818119
-.3200	1.102400	-.2879088
-.3250	1.105625	-.2940829
-.3300	1.108900	-.3003355
-.3350	1.112225	-.3066680
-.3400	1.115600	-.3130817
-.3450	1.119025	-.3195778
-.3500	1.122500	-.3261580
-.3550	1.126025	-.3328233
-.3600	1.129600	-.3395753
-.3650	1.133225	-.3464153
-.3700	1.136900	-.3533448
-.3750	1.140625	-.3603650
-.3800	1.144400	-.3674776
-.3850	1.148225	-.3746838
-.3900	1.152100	-.3819851
-.3950	1.156025	-.3893829
-.4000	1.160000	-.3968788
-.4100	1.168100	-.4121704
-.4200	1.176400	-.4278716
-.4300	1.184900	-.4439946
-.4400	1.193600	-.4605513
-.4500	1.202500	-.4775542
-.4600	1.211600	-.4950158
-.4700	1.220900	-.5129468
-.4800	1.230400	-.5313659
-.4900	1.240100	-.5502801
-.5000	1.250000	-.5697049
-.5100	1.260100	-[illegible]
-.5200	1.270400	-[illegible]
-.5300	1.280900	-.6311702
-.5400	1.291600	-.6527783
-.5500	1.302500	-.6749596
-.5600	1.313600	-[illegible]
-.5700	1.324900	-[illegible]
-.5800	1.336400	-[illegible]
-.5900	1.348100	-.7097609
-.6000	1.360000	-[illegible]

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_2)$	y_2
- .6100	1.372100	- .8210260
- .6200	1.384400	- .8476764
- .6300	1.396900	- .8750243
- .6400	1.409600	- .9030276
- .6500	1.422500	- .9318825
- .6600	1.435600	- .9614214
- .6700	1.448900	- .9917325
- .6800	1.462400	- 1.022821
- .6900	1.476100	- 1.054707
- .7000	1.490000	- 1.087410
- .7100	1.504100	- 1.120945
- .7200	1.518400	- 1.155330
- .7300	1.532900	- 1.190584
- .7400	1.547600	- 1.226724
- .7500	1.562500	- 1.263769
- .7600	1.577600	- 1.301737
- .7700	1.592900	- 1.340647
- .7800	1.608400	- 1.380518
- .7900	1.624100	- 1.421369
- .8000	1.640000	- 1.463219
- .8100	1.656100	- 1.506088
- .8200	1.672400	- 1.549996
- .8300	1.688900	- 1.594962
- .8400	1.705600	- 1.641006
- .8500	1.722500	- 1.688153
- .8600	1.739600	- 1.736418
- .8700	1.756900	- 1.785824
- .8800	1.774400	- 1.836393
- .8900	1.792100	- 1.888146
- .9000	1.810000	- 1.941104
- .9100	1.828100	- 1.995289
- .9200	1.846400	- 2.050722
- .9300	1.864900	- 2.107429
- .9400	1.883600	- 2.165429
- .9500	1.902500	- 2.224740
- .9600	1.921600	- 2.285403
- .9700	1.940900	- 2.347423
- .9800	1.960400	- 2.410829
- .9900	1.980100	- 2.47564[illegible]
- 1.0000	2.000000	- 2.541697
- 1.0100	2.020100	- 2.609601
- 1.0200	2.040400	- 2.678707

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
.0125	1.000156	.0091248
.0150	1.000225	.0109497
.0175	1.000306	.0127749
.0200	1.000400	.0146007
.0225	1.000506	.0164269
.0250	1.000625	.0182540
.0275	1.000756	.0200821
.0300	1.000900	.0219112
.0325	1.001056	.0237413
.0350	1.001225	.0255732
.0375	1.001406	.0274064
.0400	1.001600	.0292413
.0425	1.001806	.0310781
.0450	1.002025	.0329168
.0475	1.002256	.0347577
.0500	1.002500	.0366008
.0525	1.002756	.0384464
.0550	1.003025	.0402946
.0575	1.003306	.0421456
.0600	1.003600	.0439995
.0625	1.003906	.0458564
.0650	1.004225	.0477166
.0675	1.004556	.0495801
.0700	1.004900	.0514472
.0725	1.005256	.0533181
.0750	1.005625	.0551927
.0775	1.006006	.0570714
.0800	1.006400	.0589543
.0825	1.006806	.0608416
.0850	1.007225	.0627333
.0875	1.007656	.0646297
.0900	1.008100	.0665310
.0925	1.008556	.0684373
.0950	1.009025	.0703487
.0975	1.009506	.0722655
.1000	1.010000	.0741878
.1025	1.010506	.0761158
.1050	1.011025	.0780496
.1075	1.011556	.0799894
.1100	1.012100	.0819354
.1125	1.012656	.0838878
.1150	1.013225	.0858466
.1175	1.013806	.0878172
.1200	1.014400	.0897847
.1225	1.015006	.0917842
.1250	1.015625	.0937509
.1275	1.016256	.0957450
.1300	1.016900	.0977467
.1325	1.017556	.0997512

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
.1350	1.018225	.1017736
.1375	1.018906	.1037991
.1400	1.019600	.1058329
.1425	1.020306	.1078752
.1450	1.021025	.1099261
.1475	1.021756	.1119859
.1500	1.022500	.1140548
.1525	1.02[illegible]25[illegible]	.1161328
.1550	1.024025	.1182203
.1575	1.024806	.1203174
.1600	1.025600	.1224242
.1625	1.026406	.1245411
.1650	1.027225	.1266880
.1675	1.028056	.1288054
.1700	1.028900	.1309533
.1725	1.029756	.1331120
.1750	1.030625	.1352816
.1775	1.031506	.1374623
.1800	1.032400	.1396544
.1825	1.033306	.1418581
.1850	1.034225	.1440734
.1875	1.035156	.1463008
.1900	1.036100	.1485403
.1925	1.037056	.1507921
.1950	1.038025	.1530565
.1975	1.039006	.1553337
.2000	1.040070	.1576239
.2025	1.041006	.1599272
.2050	1.042025	.1622439
.2075	1.043056	.1645743
.2100	1.044100	.1669185
.2125	1.045156	.1692768
.2150	1.046225	.1716493
.2175	1.047306	.1740362
.2200	1.048400	.1764379
.2225	1.049506	.1788544
.2250	1.050625	.1812862
.2275	1.051756	.18373[illegible]3
.2300	[illegible]	[illegible]
.2325	1.054056	.1886745
.2350	1.055225	1911691
.2375	1.056406	1935799
.2400	1.057600	.1962073
.2425	.058806	.1987514
.2450	1.060025	.20131[illegible]
.2475	1.061256	.2030907
.2500	1.062500	.2064[illegible]
.2525	1.063756	.2[illegible]90999
.2550	1.06502[illegible]	.2117313

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
.2575	1.066306	.21438[illegible]9
.2600	1.067600	.2170489
.2625	1.068906	.2197355
.2650	1.070225	.2224411
.2675	1.071556	.2251658
.2700	1.072900	.2279100
.2725	1.074256	.2306738
.2750	1.075625	.2334575
.2775	1.077006	.2362615
.2800	1.078400	.2390859
.2825	1.079806	.2419310
.2850	1.[illegible]1225	.2447970
.2875	1.082656	.2476843
.2900	1.084100	.2505931
.2925	1.085556	.2535236
.2950	1.087025	.2564762
.2975	1.088506	.2594510
.3000	1.090000	.2624485
.3025	1.091506	.2654[illegible]
.3050	1.093025	.2685122
.3075	1.094556	.2715791
.3100	1.096100	.2746696
.3125	1.097656	.2777842
.3150	1.099225	.2809229
.3175	1.100806	.2840863
.3200	1.102400	.2872744
.3225	1.104006	.2904877
.3250	1.105625	.2937265
.3275	1.107256	.2969909
.3300	1.108900	.3002813
.3325	1.110556	.3035981
.3350	1.112225	.3069415
.3375	1.113906	.3103118
.3400	1.115600	.313709[illegible]
.3425	1.117306	.3171345
.3450	1.119025	.3205874
.3475	1.120756	.3240685
.3500	1.122500	.3275781
.3525	1.124256	.3311164
.3550	1.126025	.3346839
.3575	1.127806	.338[illegible]808
.3600	1.129600	.34[illegible]375
.3625	1.131406	.3455643
.3650	1.133225	.3492815
.3675	1.135056	.352969[illegible]
.3700	1.136900	.3567189
.3725	1.138756	.3604590
.3750	1.140625	.3643112
.3775	1.142506	[illegible]

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_2)$	y_2
.3800	1.144400	.3720323
.3825	1.146306	.3759419
.3850	1.148225	.3798246
.3875	1.150156	.3838608
.3900	1.152100	.3878709
.3925	1.154056	.3919151
.3950	1.156025	.3959940
.3975	1.158006	.4001078
.4000	1.160000	.4042568
.4025	1.162006	.4084415
.4050	1.164025	.4126622
.4075	1.166056	.4169193
.4100	1.168100	.4212133
.4125	1.170156	.4255443
.4150	1.172225	.4299129
.4175	1.174306	.4343194
.4200	1.176400	.4387642
.4225	1.178506	.4432477
.4250	1.180625	.4477703
.4275	1.182756	.4523323
.4300	1.184900	.4569342
.4325	1.187056	.4615764
.4350	1.189225	.4662593
.4375	1.191406	.47098[illegible]2
.4400	1.193600	.4757487
.4425	1.195806	.4805560
.4450	1.198025	.4854057
.4475	1.200256	.4902980
.4500	1.202500	.4952336
.4525	1.204756	.5002127
.4550	1.207025	.5052358
.4575	1.209306	.5103034
.4600	1.211600	.5154158
.4625	1.213906	.5205735
.4650	1.216225	.5257[illegible]
.4675	1.218556	.5310266
.4700	1.220900	.5363228
.4725	1.223256	.5416661
.4750	1.225625	.547[illegible]
.4775	1.228006	.5524958
.4800	1.230400	.5579830
.4825	1.232806	5638192
.4850	1.235225	.5691047
.4875	1.237656	.5747401
.4900	1.240100	[illegible]
.4925	1.242556	.5861621
.4950	1.245025	.5919[illegible]
.4975	1.247506	.5977[illegible]
.5000	1.250000	.6[illegible]807

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1 (=\delta_2)$	y_3
.5025	1.252506	.6096250
.5050	1.255025	.6156225
.5075	1.257556	.6216737
.5100	1.260100	.6277790
.5125	1.262656	.6339390
.5150	1.265225	.6401542
.5175	1.267806	.6464251
.5200	1.270400	.6527522
.5225	1.273006	.6591360
.5250	1.275625	.6655770
.5275	1.278256	.6720759
.5300	1.280900	.6786329
.5325	1.283556	.6852488
.5350	1.286225	.6919241
.5375	1.288906	.6986592
.5400	1.291600	.7054547
.5425	1.294306	.7123113
.5450	1.297025	.7192293
.5475	1.299756	.7262093
.5500	1.302500	.7332520
.5525	1.305256	.7403579
.5550	1.308025	.7475275
.5575	1.310806	.7547614
.5600	1.313600	.7620601
.5625	1.316406	.7694244
.5650	1.319225	.7768546
.5675	1.322056	.7843514
.5700	1.324900	.7919155
.5725	1.327756	.7995473
.5750	1.330625	.8072475
.5775	1.333506	.8150166
.5800	1.336400	.8228553
.5825	1.339306	.8307642
.5850	1.342225	.8387438
.5875	1.345156	.8467949
.5900	1.348100	.8549179
.5925	1.351056	.8631136
.5950	1.354025	.8713826
.5975	1.357006	.8797254
.6000	1.360000	.8881428
.6025	1.363006	.8966[illegible]33
.6050	1.366025	.9052036
.6075	1.369056	.9138483
.6100	1.372100	[illegible]
.6125	1.375156	[illegible]
.6150	1.378225	[illegible]
.6175	1.381306	.9492048
.6200	1.384400	[illegible]
.6225	1.387506	[illegible]

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
.6250	1.390625	.9765570
.6275	1.393756	.9858371
.6300	1.396900	.9951996
.6325	1.400056	1.004645
.6350	1.403225	1.014174
.6375	1.406406	1.023785
.6400	1.409600	1.033487
.6425	1.412806	1.04327[illegible]
.6450	1.416025	1.053144
.6475	1.419256	1.063103
.6500	1.422500	1.073150
.6525	1.425756	1.083286
.6550	1.429025	1.093512
.6575	1.432306	1.103828
.6600	1.435600	1.114235
.6625	1.438906	1.124733
.6650	1.442225	1 135324
.6675	1.445556	1.146008
.6700	1.448900	1.156787
.6725	1.452256	1.167660
.6750	1.455625	1.178628
.6775	1.459006	1.189693
.6800	1.462400	1.200855
.6825	1.465806	1.212115
.6850	1.469225	1.22[illegible]473
.6875	1.472656	1.2349[illegible]1
.6900	1.476100	1.246489
.6925	1.479556	1.258148
.6950	1.483025	1.269909
.6975	1.486506	1.281772
.7000	1.490000	1.293739
.7025	1.493506	1.305810
.7050	1.497025	1.317987
.7075	1.500556	1.330269
.7100	1.504100	1.342658
.7125	1.507656	1.355151
.7150	1.511225	1.36775[illegible]
.7175	1.514806	1 380[illegible]74
.7200	1.518400	1.393[illegible]98
.7225	1.522006	1.406[illegible]34
.7250	1.525625	1.4[illegible]9[illegible]91
.7275	1.529256	1.43[illegible]441
.7300	1.532900	1.44571[illegible]
.7325	1.536556	1.4[illegible]10
.7350	1.540225	1.4[illegible]
.7375	1.543906	1.4862[illegible]
.7400	1.547600	1 49[illegible]
.7425	1.551306	1.[illegible]
.7450	1.555025	1.[illegible]7701

Table 3 (Continued)

(b) $-1.0200 \le \xi \le 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
.7475	1.558756	1.541885
.7500	1.562500	1.556100
.7525	1.566256	1.570436
.7550	1.570025	1.584895
.7575	1.573806	1.599477
.7600	1.577600	1.614184
.7625	1.581406	1.629017
.7650	1.585225	1.643976
.7675	1.589056	1.659062
.7700	1.592900	1.674276
.7725	1.596756	1.689620
.7750	1.600625	1.705094
.7775	1.604506	1.720689
.7800	1.608400	1.736437
.7825	1.612306	1.752308
.7850	1.616225	1.768313
.7875	1.620156	1.784453
.7900	1.624100	1.800729
.7925	1.628056	1.817142
.7950	1.632025	1.833694
.7975	1.636006	1.850385
.8000	1.640000	1.867216
.8025	1.644006	1.884188
.8050	1.648025	1.901303
.8075	1.652056	1.918561
.8100	1.656100	1.935964
.8125	1.660156	1.953512
.8150	1.664225	1.971207
.8175	1.668306	1.989049
.8200	1.672400	2.007040
.8225	1.676506	2.025181
.8250	1.680625	2.043472
.8275	1.684756	2.061916
.8300	1.688900	2.080512
.8325	1.693056	2.099263
.8350	1.697225	2.118169
.8375	1.701406	2.137231
.8400	1.705600	2.156451
.8425	1.709806	2.1756[illegible]
.8450	1.714025	2.195[illegible]67
.8475	1.718256	2.215066
.8500	1.722[illegible]00	2.[illegible]28
.8525	1.726756	2.2[illegible]452
.8550	1.731025	2.2[illegible]140
.8575	1.735306	2.[illegible]
.8600	1.739600	2.[illegible]
.8625	1.743906	2.[illegible]
.8650	1.748225	2.[illegible]
.8675	1.752556	2.[illegible]

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1 (= \delta_2)$	y_2
.8700	1.756900	2.399[illegible]
.8725	1.761256	2.4211[illegible]
.8750	1.765625	2.442707
.8775	1.770006	2.464428
.8800	1.[illegible]74[illegible]0	2.48[illegible]
.8825	1.7[illegible]88[illegible]6	2.508399
.8850	1.78322[illegible]	2.530653
.8875	1.78765[illegible]	2.553086
.8900	1.792100	2.57[illegible]701
.8925	1.796556	2.59849[illegible]
.8950	1.801025	2.621478
.8975	1.805506	[illegible].644644
.9000	1.810000	2.667996
.9025	1.814506	2.691535
.9050	1.819025	2.715264
.9075	1.[illegible]23556	2.739182
.9100	1.[illegible]28100	2.763[illegible]92
.9125	1.832656	2.787594
.9150	1.8[illegible]7225	2.8120[illegible]1
.9175	1.84[illegible]06	2.836783
.9200	1.846400	2.861672
.9225	1.85[illegible]06	2.886758
.9250	1.855[illegible]25	2.912044
.9275	1.860256	2.937531
.9300	1.864900	2.963220
.9[illegible]	1.869556	2.98911[illegible]
.9350	1.87422[illegible]	3.0152[illegible]
.9375	1.878906	3.04[illegible]
.9400	1.88360[illegible]	3.0680[illegible]
.9425	1.88[illegible]	3.[illegible]4742
.9450	1.89[illegible]025	3.[illegible]671
.9475	1.897756	3.[illegible]
.9500	1.902500	3.176167
.9525	1.907256	3.[illegible]
.9550	1.912025	[illegible]
.9575	1.91[illegible]	3.[illegible]
.9600	1.921600	[illegible]
.9625	1.926406	3.[illegible]
.9650	1.93122[illegible]	3.[illegible]
.9675	1.9[illegible]	[illegible]
.9700	1.940900	[illegible]
.9725	1.9457[illegible]	[illegible]
.9750	1.9506[illegible]	[illegible]
.9775	1.955[illegible]6	[illegible]
.9800	1.960400	[illegible]
.9825	1.9[illegible]	[illegible]
.9850	1.970[illegible]	[illegible]
.9875	1.975156	[illegible]
.9900	1.980100	3.54[illegible]97

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_a)$	y_2
.9925	1.985056	3.675197
.9950	1.990025	3.706636
.9975	1.995006	3.738316
1.0000	2.000000	3.770239
1.0025	2.005006	3.802406
1.0050	2.010025	3.834819
1.0075	2.015056	3.867480
1.0100	2.020100	3.900389
1.0125	2.025156	3.933549
1.0150	2.030225	3.96596[illegible]
1.0175	2.035306	4.000627
1.0200	2.040400	4.034549
1.0225	2.045506	4.068[illegible]
1.0250	2.050625	4.103164
1.0275	2.055756	4.137882
1.0300	2.060900	4.172821
1.0325	2.066056	4.208044
1.0350	2.071225	4.243532
1.0375	2.076406	4.279287
1.0400	2.081600	4.315310
1.0425	2.086806	4.351604
1.0450	2.092025	4.388169
1.0475	2.097256	4.425008
1.0500	2.102500	4.462123
1.0525	2.107756	4.499514
1.0550	2.113025	4.537184
1.0575	2.118306	4.575134
1.0600	2.123600	4.613367
1.0625	2.128906	4.651884
1.0650	2.134225	4.690686
1.0675	2.139556	4.729776
1.0700	2.144900	4.769155
1.0725	2.150256	4.808824
1.0750	2.155625	4.848787
1.0775	2.151006	4.889044
1.0800	2.166400	4.929597
1.0825	2.171806	4.970449
1.0850	2.177225	5.011600
1.0875	2.182656	5.0530[illegible]
1.0900	2.188100	5.09[illegible]610
1.0925	2.193556	5.[illegible]72
1.0950	2.199025	5.179241
1.0975	2.204506	[illegible].221020
1.1000	2.210000	[illegible].264109
1.1025	2.215506	[illegible]
1.1050	2.221025	[illegible]
1.1075	2.226556	[illegible]
1.1100	2.232100	[illegible].440014
1.1125	2.237656	[illegible]

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_2)$	y_2
1.1150	2.243225	5.529480
1.1175	2.248806	5.574699
1.1200	2.254400	5.620244
1.1225	2.260006	5.666117
1.1250	2.265625	5.712320
1.1275	2.271256	5.758855
1.1300	2.276900	5.805724
1.1325	2.282556	5.852929
1.1350	2.288225	5.900471
1.1375	2.293906	5.948354
1.1400	2.299600	5.996578
1.1425	2.305306	6.045146
1.1450	2.311025	6.094060
1.1475	2.316756	6.143321
1.1500	2.322500	6.192937
1.1525	2.328256	6.242897
1.1550	2.334025	6.293214
1.1575	2.339806	6.343887
1.1600	2.345600	6.394919
1.1625	2.351406	6.446311
1.1650	2.357225	6.498065
1.1675	2.363056	6.550183
1.1700	2.368900	6.602667
1.1725	2.374756	6.655520
1.1750	380625	6.708744
1.1775	2.386506	6.762341
1.1800	2.392400	6.816317
1.1825	2.398306	6.870660
1.1850	2.404225	6.925388
1.1875	2.410156	6.980496
1.1900	2.416100	7.035984
1.1925	2.422056	7.091862
1.1950	2.428025	7.148132
1.1975	2.434006	7.204788
1.2000	2.440000	7.261836
1.2025	2.446006	7.319278
1.2050	2.452025	7.377117
1.2075	2.458056	7.4353[illegible]
1.2100	2.464100	7.49[illegible]4
1.2125	2.470156	7.[illegible]
1.2150	2.476225	7.61[illegible]85
1.2175	2.482306	7.672341
1.2200	2.488400	7.732607
1.2225	2.494506	7.79[illegible]
1.2250	2.500625	[illegible]
1.2275	2.506756	7.91[illegible]
1.2300	2.512900	7.977818
1.2325	2.519056	8.040109
1.2350	2.525[illegible]	8.102[illegible]

Table 3 (Continued)

(b) $1.0200 \leq \xi \leq 3.1250$

ξ	$y_2 (= \delta_2)$	y_3
1.2375	2.531406	8.166146
1.2400	2.537600	8.229776
1.2425	2.543806	8.293837
1.2450	2.550025	8.358332
1.2475	2.556256	8.423262
1.2500	2.562500	8.488631
1.2525	2.568756	8.554440
1.2550	2.575025	8.620692
1.2575	2.581306	8.687389
1.2600	2.587600	8.754534
1.2625	2.593906	8.822129
1.2650	2.600225	8.890177
1.2675	2.606556	8.958680
1.2700	2.612900	9.027641
1.2725	2.619256	9.097061
1.2750	2.625625	9.166944
1.2775	2.632006	9.237293
1.2800	2.638400	9.308108
1.2825	2.644806	9.379393
1.2850	2.651225	9.451151
1.2875	2.657656	9.523384
1.2900	2.664100	9.596095
1.2925	2.670556	9.669286
1.2950	2.677025	9.742959
1.2975	2.683506	9.817118
1.3000	2.690000	9.891764
1.3025	2.696506	9.966901
1.3050	2.703025	10.04253
1.3075	2.709556	10.11865
1.3100	2.716100	10.19527
1.3125	2.722656	10.27240
1.3150	2.729225	10.35003
1.3175	2.735806	10.42816
1.3200	2.742400	10.50680
1.3225	[illegible]	[illegible]
1.3250	[illegible]	[illegible]
1.3275	[illegible]	[illegible]
1.3300	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1.3350	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
1.3400	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1240$

ξ	$y_1 (= \delta_1)$	y_2
1.3600	2.849600	11.[illegible]
1.3625	2.856406	11.[illegible]
1.3650	2.863225	12.01245
1.3675	2.870056	12.10127
1.3700	2.876900	12.19066
1.3725	2.883756	12.28062
1.3750	2.890625	12.37115
1.3775	2.897506	12.46224
1.3800	2.904400	12.55392
1.3825	2.911306	12.64617
1.3850	2.918225	12.73900
1.3875	2.925156	12.83242
1.3900	2.932100	12.92643
1.3925	2.939056	13.02102
1.3950	2.946025	13.11621
1.3975	2.953006	13.21199
1.4000	2.960000	13.30836
1.4025	2.967006	13.40536
1.4050	2.974025	13.50295
1.4075	2.981056	13.60115
1.4100	2.988100	13.69996
1.4125	2.995156	13.79938
1.4150	3.002225	13.89942
1.4175	3.009306	14.00008
1.4200	3.016400	14.10136
1.4225	3.023506	14.20327
1.4250	3.030625	14.30581
1.4275	3.037756	14.40898
1.4300	3.044900	14.51278
1.4325	3.052056	14.61722
1.4350	3.059225	14.72232
1.4375	3.066406	14.82805
1.4400	3.073600	14.93443
1.4425	3.080806	15.04147
1.4450	3.088025	15.14916
1.4475	3.095[illegible]	15.[illegible]
1.4500	3.102500	15.[illegible]
1.4525	3.109[illegible]	[illegible]
1.4550	3.117[illegible]	[illegible]
1.4575	3.124[illegible]	[illegible]
1.4600	3.131600	[illegible]
1.4625	[illegible]	[illegible]
1.4650	[illegible]	[illegible]
1.4675	[illegible]	[illegible]
1.4700	[illegible]	[illegible]
1.4725	[illegible]	[illegible]
1.4750	[illegible]	[illegible]
1.4775	[illegible]	[illegible]
1.4800	[illegible]	[illegible]

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_2)$	y_2
1.4825	3.197806	16.84513
1.4850	3.205225	16.96372
1.4875	3.212656	17.08303
1.4900	3.220100	17.20305
1.4925	3.227556	17.32378
1.4950	3.235025	17.44524
1.4975	3.242506	17.56742
1.5000	3.250000	17.69032
1.5025	3.257506	17.81396
1.5050	3.265025	17.93833
1.5075	3.272556	18.06343
1.5100	3.280100	18.18928
1.5125	3.287656	18.31587
1.5150	3.295225	18.44321
1.5175	3.302806	18.57130
1.5200	3.310400	18.70014
1.5225	3.318006	18.82975
1.5250	3.325625	18.96011
1.5275	3.333256	19.09124
1.5300	3.340900	19.22314
1.5325	3.348556	19.35581
1.5350	3.356225	19.48925
1.5375	3.363906	19.62348
1.5400	3.371600	19.75849
1.5425	3.379306	19.89428
1.5450	3.387025	20.03087
1.5475	3.394756	20.16825
1.5500	3.402500	20.30643
1.5525	3.410256	20.44540
1.5550	3.418025	20.58519
1.5575	3.425806	20.72578
1.5600	3.433600	20.86718
1.5625	3.441406	21.00940
1.5650	3.449225	21.15244
1.5675	3.457056	21.29631
1.5700	3.464900	21.44100
1.5725	3.472756	21.58652
1.5750	3.480625	21.73287
1.5775	3.488506	21.88007
1.5800	3.496400	22.02810
1.5825	3.504306	22.17698
1.5850	3.512225	22.32672
1.5875	3.520156	22.47730
1.5900	3.528100	22.62874
1.5925	3.536056	22.78105
1.5950	3.544025	22.93422
1.5975	3.552006	23.08826
1.6000	3.560000	23.24317
1.6025	3.568006	23.39895

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
1.6050	3.576025	23.55562
1.6075	3.584056	23.71318
1.6100	3.592100	23.87162
1.6125	3.600156	24.03095
1.6150	3.608225	24.19118
1.6175	3.616306	24.35231
1.6200	3.624400	24.51435
1.6225	3.632506	24.67729
1.6250	3.640625	24.84115
1.6275	3.648756	25.00592
1.6300	3.656900	25.17161
1.6325	3.665056	25.33823
1.6350	3.673225	25.50577
1.6375	3.681406	25.67425
1.6400	3.689600	25.84366
1.6425	3.697806	26.01402
1.6450	3.706025	26.18532
1.6475	3.714256	26.35757
1.6500	3.722500	26.53077
1.6525	3.730756	26.70493
1.6550	3.739025	26.88005
1.6575	3.747306	27.05613
1.6600	3.755600	27.23319
1.6625	3.763906	27.41121
1.6650	3.772225	27.59022
1.6675	3.780556	27.77021
1.6700	3.788900	27.95118
1.6725	3.797256	28.13315
1.6750	3.805625	28.31611
1.6775	3.814006	28.50007
1.6800	3.822400	28.68503
1.6825	3.830806	28.87101
1.6850	3.839225	29.05799
1.6875	3.847656	29.24599
1.6900	3.856100	29.43501
1.6925	3.864556	29.62505
1.6950	3.873025	29.81613
1.6975	3.881506	30.00824
1.7000	3.890000	30.20138
1.7025	3.898506	30.39557
1.7050	3.907025	30.59081
1.7075	3.915556	30.78709
1.7100	3.924100	30.98444
1.7125	3.932656	31.18284
1.7150	3.941225	31.38231
1.7175	3.949806	31.58284
1.7200	3.958400	31.78445
1.7225	3.967006	31.98714
1.7250	3.975625	32.19091

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
1.7275	3.984256	32.39577
1.7300	3.992900	32.60172
1.7325	4.001556	32.80876
1.7350	4.010225	33.01691
1.7375	4.018906	33.22616
1.7400	4.027600	33.43652
1.7425	4.036306	33.64800
1.7450	4.045025	33.86059
1.7475	4.053756	34.07431
1.7500	4.062500	34.28915
1.7525	4.071256	34.50513
1.7550	4.080025	34.72225
1.7575	4.088806	34.94051
1.7600	4.097600	35.15992
1.7625	4.106406	35.38047
1.7650	4.115225	35.60219
1.7675	4.124056	35.82506
1.7700	4.132900	36.04910
1.7725	4.141756	36.27431
1.7750	4.150625	36.50070
1.7775	4.159506	36.72827
1.7800	4.168400	36.95702
1.7825	4.177306	37.18696
1.7850	4.186225	37.41810
1.7875	4.195156	37.65043
1.7900	4.204100	37.88397
1.7925	4.213056	38.11872
1.7950	4.222025	38.35468
1.7975	4.231006	38.59187
1.8000	4.240000	38.83027
1.8025	4.249006	39.06990
1.8050	4.258025	39.31077
1.8075	4.267056	39.55288
1.8100	4.276100	39.79623
1.8125	4.285156	40.04083
1.8150	4.294225	40.28668
1.8175	4.303306	40.53379
1.8200	4.312400	40.78216
1.8225	4.321506	41.03180
1.8250	4.330625	41.28272
1.8275	4.339756	41.53491
1.8300	4.348900	41.78839
1.8325	4.358056	42.04316
1.8350	4.367225	42.29922
1.8375	4.376406	42.55658
1.8[illegible]00	4.385600	42.81524
1.8425	4.394806	43.07521
1.8450	4.404025	43.33649
1.8475	4.413256	43.59910

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
1.8500	4.422500	43.86303
1.8525	4.431756	44.12829
1.8550	4.441025	44.39488
1.8575	4.450306	44.66282
1.8600	4.459600	44.93210
1.8625	4.468906	45.20273
1.8650	4.478225	45.47471
1.8675	4.487556	45.74806
1.8700	4.496900	46.02278
1.8725	4.506256	46.29886
1.8750	4.515625	46.57633
1.8775	4.525006	46.85517
1.8800	4.534400	47.13541
1.8825	4.543806	47.41703
1.8850	4.553225	47.70006
1.8875	4.562656	47.98449
1.8900	4.572100	48.27033
1.8925	4.581556	48.55758
1.8950	4.591025	48.84625
1.8975	4.600506	49.13635
1.9000	4.610000	49.42788
1.9025	4.619506	49.72085
1.9050	4.629025	50.01526
1.9075	4.638556	50.31111
1.9100	4.648100	50.60842
1.9125	4.657656	50.90719
1.9150	4.667225	51.20742
1.9175	4.676806	51.50912
1.9200	4.686400	51.81230
1.9225	4.696006	52.11695
1.9250	4.705625	52.42310
1.9275	4.715256	52.73073
1.9300	4.724900	53.03986
1.9325	4.734556	53.35050
1.9350	4.744225	53.66264
1.9375	4.753906	53.97630
1.9400	4.763600	54.29148
1.9425	4.773306	54.60819
1.9450	4.783025	54.92643
1.9475	4.792756	55.24620
1.9500	4.802500	55.56752
1.9525	4.812256	55.89038
1.9550	4.822025	56.21481
1.9575	4.831806	56.54079
1.9600	4.841600	56.86834
1.9625	4.851406	57.19746
1.9650	4.861225	57.52815
1.9675	4.871056	57.86044
1.9700	4.880900	58.19431

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1 (= \dot{\delta}_2)$	y_3
1.9725	4.890756	58.52977
1.9750	4.900625	58.86684
1.9775	4.910506	59.20552
1.9800	4.920400	59.54581
1.9825	4.930306	59.88771
1.9850	4.940225	60.23125
1.9875	4.950156	60.57641
1.9900	4.960100	60.92321
1.9925	4.970056	61.27165
1.9950	4.980025	61.62175
1.9975	4.990006	61.97349
2.0000	5.000000	62.32690
2.0025	5.010006	62.68196
2.0050	5.020025	63.03873
2.0075	5.030056	63.39716
2.0100	5.040100	63.75727
2.0125	5.050156	64.11908
2.0150	5.060225	64.48258
2.0175	5.070306	64.84779
2.0200	5.080400	65.21470
2.0225	5.090506	65.58334
2.0250	5.100625	65.95369
2.0275	5.110756	66.32578
2.0300	5.120900	66.69959
2.0325	5.131056	67.07515
2.0350	5.141225	67.45246
2.0375	5.151406	67.83152
2.0400	5.161600	68.21234
2.0425	5.171806	68.59493
2.0450	5.182025	68.97928
2.0475	5.192256	69.36542
2.0500	5.202500	69.75334
2.0525	5.212756	70.14306
2.0550	5.223025	70.53457
2.0575	5.233306	70.92788
2.0600	5.243600	71.32301
2.0625	5.253906	71.71995
2.0650	5.264225	72.11872
2.0675	5.274556	72.51931
2.0700	5.284900	72.92174
2.0725	5.295256	73.32602
2.0750	5.305625	73.73214
2.0775	5.316006	74.14012
2.0800	5.326400	74.54997
2.0825	5.336806	74.96168
2.0850	5.347225	75.37526
2.0875	5.357656	75.79073
2.0900	5.368100	76.20809
2.0925	5.378556	76.62734

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
2.0950	5.389025	77.04850
2.0975	5.399506	77.47156
2.1000	5.410000	77.89654
2.1025	5.420506	78.32344
2.1050	5.431025	78.75227
2.1075	5.441556	79.18303
2.1100	5.452100	79.61574
2.1125	5.462656	80.05039
2.1150	5.473225	80.48700
2.1175	5.483806	80.92557
2.1200	5.494400	81.36611
2.1225	5.505006	81.80863
2.1250	5.515625	82.25312
2.1275	5.526256	82.69961
2.1300	5.536900	83.14810
2.1325	5.547556	83.59858
2.1350	5.558225	84.05108
2.1375	5.568906	84.50559
2.1400	5.579600	84.96213
2.1425	5.590306	85.42070
2.1450	5.601025	85.88130
2.1475	5.611756	86.34395
2.1500	5.622500	86.80865
2.1525	5.633256	87.27541
2.1550	5.644025	87.74424
2.1575	5.654806	88.21514
2.1600	5.665600	88.68811
2.1625	5.676406	89.16318
2.1650	5.687225	89.64033
2.1675	5.698056	90.11959
2.1700	5.708900	90.60096
2.1725	5.719756	91.08444
2.1750	5.730625	91.57004
2.1775	5.741506	92.05777
2.1800	5.752400	92.54764
2.1825	5.763306	93.03965
2.1850	5.774225	93.53381
2.1875	5.785156	94.03013
2.1900	5.796100	94.52862
2.1925	5.807056	95.029[illegible]8
2.1950	5.818025	95.53211
2.1975	5.829006	96.03714
2.2000	5.840000	96.54436
2.2025	5.851006	97.05378
2.2050	5.862025	97.56541
2.2075	5.873056	98.07925
2.2100	5.884100	98.59532
2.2125	5.895156	99.11362
2.2150	5.906225	99.63416

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
2.2175	5.917306	100.1569
2.2200	5.928400	100.6819
2.2225	5.939506	101.2092
2.2250	5.950625	101.7388
2.2275	5.961756	102.2706
2.2300	5.972900	102.8048
2.2325	5.984056	103.3412
2.2350	5.995225	103.8799
2.2375	6.006406	104.4209
2.2400	6.017600	104.9642
2.2425	6.028806	105.5099
2.2450	6.040025	106.0579
2.2475	6.051256	106.6082
2.2500	6.062500	107.1608
2.2525	6.073756	107.7159
2.2550	6.085025	108.2732
2.2575	6.096306	108.8330
2.2600	6.107600	109.3951
2.2625	6.118906	109.9596
2.2650	6.130225	110.5265
2.2675	6.141556	111.0957
2.2700	6.152900	111.6674
2.2725	6.164256	112.2415
2.2750	6.175625	112.8180
2.2775	6.187006	113.3970
2.2800	6.198400	113.9784
2.2825	6.209806	114.5622
2.2850	6.221225	115.1485
2.2875	6.232656	115.7372
2.2900	6.244100	116.3284
2.2925	6.255556	116.9221
2.2950	6.267025	117.5183
2.2975	6.278506	118.1169
2.3000	6.290000	118.7181
2.3025	6.301506	119.3217
2.3050	6.313025	119.9279
2.3075	6.324556	120.5366
2.3100	6.336100	121.1479
2.3125	6.347656	121.7616
2.3150	6.359225	122.3740
2.3175	6.370806	122.9968
2.3200	6.382400	123.6183
2.3225	6.394006	124.2423
2.3250	6.405625	124.8689
2.3275	6.417256	125.4981
2.3300	6.428900	126.1299
2.3325	6.440556	126.7643
2.3350	6.452225	127.4012
2.3375	6.463906	128.0409

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
2.3400	6.475600	128.6831
2.3425	6.487306	129.3280
2.3450	6.499025	129.9755
2.3475	6.510756	130.6257
2.3500	6.522500	131.2786
2.3525	6.534256	131.9341
2.3550	6.546025	132.5923
2.3575	6.557806	133.2532
2.3600	6.569600	133.9167
2.3625	6.581406	134.5830
2.3650	6.593225	135.2520
2.3675	6.605056	135.9237
2.3700	6.616900	136.5982
2.3725	6.628756	137.2754
2.3750	6.640625	137.9553
2.3775	6.652506	138.6380
2.3800	6.664400	139.3235
2.3825	6.676306	140.0117
2.3850	6.688225	140.7027
2.3875	6.700156	141.3965
2.3900	6.712100	142.0931
2.3925	6.724056	142.7925
2.3950	6.736025	143.4947
2.3975	6.748006	144.1997
2.4000	6.760000	144.9076
2.4025	6.772006	145.6183
2.4050	6.784025	146.3319
2.4075	6.796056	147.0483
2.4100	6.808100	147.7676
2.4125	6.820156	148.4897
2.4150	6.832225	149.2148
2.4175	6.844306	149.9427
2.4200	6.856400	150.67 5
2.4225	6.868506	151.4073
2.4250	6.880625	152.1440
2.4275	6.892756	152.8836
2.4300	6.904900	153.6261
2.4325	6.917056	154.3716
2.4350	6.929225	155.1200
2.4375	6.941406	155.8714
2.4400	6.953600	156.6258
2.4425	6.965806	157.3832
2.4450	6.978025	158.1435
2.4475	6.990256	158.9069
2.4500	7.002500	159.6732
2.4525	7.014756	160.4426
2.4550	7.027025	161.2150
2.4575	7.039306	161.9905
2.4600	7.051600	162.7689

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1(-\delta_2)$	y_3
2.4625	7.063906	163.5505
2.4650	7.076225	164.3351
2.4675	7.088556	165.1228
2.4700	7.100900	165.9135
2.4725	7.113256	166.7074
2.4750	7.125625	167.5043
2.4775	7.138006	168.3044
2.4800	7.150400	169.1076
2.4825	7.162806	169.9139
2.4850	7.175225	170.7233
2.4875	7.187656	171.5359
2.4900	7.200100	172.3517
2.4925	7.212556	173.1706
2.4950	7.225025	173.9 27
2.4975	7.237506	174.8180
2.5000	7.250000	175.6464
2.5025	7.262506	176.4781
2.5050	7.275025	177.3130
2.5075	7.287556	178.1511
2.5100	7.300100	178.9924
2.5125	7.312656	179.8370
2.5150	7.325225	180.6848
2.5175	7.337806	181.5359
2.5200	7.350400	182.3903
2.5225	7.363006	183.2479
2.5250	7.375625	184.1088
2.5275	7.388256	184.9730
2.5300	7.400900	185.8406
2.5325	7.413556	186.7114
2.5350	7.426225	187.5856
2.5375	7.438906	188.4631
2.5400	7.451600	189.3439
2.5425	7.464306	190.2281
2.5450	7.477025	191.1157
2.5475	7.489756	192.0067
2.5500	7.502500	192.9010
2.5525	7.515256	193.7987
2.5550	7.528025	194.6999
2.5575	7.540806	195.6044
2.5600	7.553600	196.5124
2.5625	7.566406	197.4238
2.5650	7.579225	[illegible]3.3387
2.5675	7.592056	199.2570
2.5700	7.604900	200.1787
2.5725	7.617756	201.1040
2.5750	7.630625	202.0327
2.5775	7.643506	202.9649
2.5800	7.656400	203.9007
2.5825	7.669306	204.8399

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
2.5850	7.682225	205.7827
2.5875	7.695153	206.7289
2.5900	7.708100	207.6788
2.5925	7.721056	208.6322
2.5950	7.734025	209.5891
2.5975	7.747006	210.5497
2.6000	7.760000	211.5138
2.6025	7.773006	212.4815
2.6050	7.786025	213.4528
2.6075	7.799056	214.4277
2.6100	7.812100	215.4063
2.6125	7.825156	216.3885
2.6150	7.838225	217.3743
2.6175	7.851306	218.3638
2.6200	7.864400	219.3570
2.6225	7.877506	220.3538
2.6250	7.890625	221.3543
2.6275	7.903756	222.3585
2.6300	7.916900	223.3665
2.6325	7.930056	224.3781
2.6350	7.943225	225.3935
2.6375	7.956406	226.4126
2.6400	7.969600	227.4354
2.6425	7.982806	228.4621
2.6450	7.996025	229.4924
2.6475	8.009256	230.5266
2.6500	8.022500	231.5646
2.6525	8.035756	232.6063
2.6550	8.049025	233.6519
2.6575	8.062306	234.7013
2.6600	8.075600	235.7545
2.6625	8.088906	236.8116
2.6650	8.102225	237.8725
2.6675	8.115556	238.9373
2.6700	8.123900	240.0060
2.6725	8.142256	241.0785
2.6750	8.155625	242.1550
2.6775	8.169006	243.2354
2.6800	8.182400	244.3190
2.6825	8.195806	245.4078
2.6850	8.209225	246.5000
2.6875	8.222656	247.[illegible]961
2.6900	8.236100	248.[illegible]962
2.6925	8.249556	249.8002
2.6950	8.263025	250.9082
2.6975	8.276506	252.0202
2.7000	8.290000	253.1362
2.7025	8.303506	254.2563
2.7050	8.317025	255.3803

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
2.7075	8.330556	256.5084
2.7100	8.344100	257.6406
2.7125	8.357656	258.7768
2.7150	8.371225	259.9171
2.7175	8.384806	261.0615
2.7200	8.398400	262.2099
2.7225	8.412006	263.3625
2.7250	8.425625	264.5192
2.7275	8.439256	265.6800
2.7300	8.452900	266.8449
2.7325	8.466556	268.0140
2.7350	8.480225	269.1873
2.7375	8.493906	270.3647
2.7400	8.507600	271.5463
2.7425	8.521306	272.7321
2.7450	8.535025	273.9221
2.7475	8.548756	275.1164
2.7500	8.562500	276.3148
2.7525	8.576256	277.5175
2.7550	8.590025	278.7245
2.7575	8.603806	279.9357
2.7600	8.617600	281.1512
2.7625	8.631406	282.3709
2.7650	8.645225	283.5950
2.7675	8.659056	284.8234
2.7700	8.672900	286.0560
2.7725	8.686756	287.2931
2.7750	8.700625	288.5344
2.7775	8.714506	289.7802
2.7800	8.728400	291.0302
2.7825	8.742306	292.2847
2.7850	8.756225	293.5436
2.7875	8.770156	294.8068
2.7900	8.784100	296.0745
2.7925	8.798056	297.3466
2.7950	8.812025	298.6231
2.7975	8.826006	299.9041
2.8000	8.840000	301.1895
2.8025	8.854006	302.4794
2.8050	8.868025	303.7738
2.8075	8.882056	305.0726
2.8100	8.896100	306.3760
2.8125	8.910156	307.6839
2.8150	8.924225	308.9963
2.8175	8.938306	310.3133
2.8200	8.952400	311.6348
2.8225	8.966506	312.9609
2.8250	8.980625	314.2916
2.8275	8.994756	315.6269

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
2.8300	9.008900	316.9667
2.8325	9.023056	318.3112
2.8350	9.037225	319.6603
2.8375	9.051406	321.0140
2.8400	9.065600	322.3724
2.8425	9.079806	323.7354
2.8450	9.094025	325.1031
2.8475	9.108256	326.4755
2.8500	9.122500	327.8526
2.8525	9.136756	329.2345
2.8550	9.151025	330.6210
2.8575	9.165306	332.0123
2.8600	9.179600	333.4083
2.8625	9.193906	334.8090
2.8650	9.208225	336.2146
2.8675	9.222556	337.6249
2.8700	9.236900	339.0400
2.8725	9.251256	340.4600
2.8750	9.265625	341.8847
2.8775	9.280006	343.3143
2.8800	9.294400	344.7487
2.8825	9.308806	346.1880
2.8850	9.323225	347.6321
2.8875	9.337656	349.0812
2.8900	9.352100	350.5351
2.8925	9.366556	351.9940
2.8950	9.381025	353.4577
2.8975	9.395506	354.9264
2.9000	9.410000	356.4000
2.9025	9.424506	357.8786
2.9050	9.439025	359.3622
2.9075	9.453556	360.8507
2.9100	9.468100	362.3443
2.9125	9.482656	363.8428
2.9150	9.497225	365.3464
2.9175	9.511806	366.8550
2.9200	9.526400	368.3686
2.9225	9.541006	369.8874
2.9250	9.555625	371.4111
2.9275	9.570256	372.9400
2.9300	9.584900	374.4740
2.9325	9.599556	376.0130
2.9350	9.614225	377.5572
2.9375	9.628906	379.1065
2.9400	9.643600	380.6610
2.9425	9.658306	382.2207
2.9450	9.673025	383.7855
2.9475	9.6[illegible]7756	385.3555
2.9500	9.702500	386.9307

Table 3 (Continued)

(b) $-1.0200 \leq \xi \leq 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
2.9525	9.717256	388.5111
2.9550	9.732025	390.0967
2.9575	9.746806	391.6876
2.9600	9.761600	393.2838
2.9625	9.776406	394.8852
2.9650	9.791225	396.4918
2.9675	9.806056	398.1038
2.9700	9.820900	399.7211
2.9725	9.835756	401.3437
2.9750	9.850625	402.9716
2.9775	9.865506	404.6049
2.9800	9.880400	406.2435
2.9825	9.895306	407.8875
2.9850	9.910225	409.5369
2.9875	9.925156	411.1917
2.9900	9.940100	412.8519
2.9925	9.955056	414.5175
2.9950	9.970025	416.1886
2.9975	9.985006	417.8651
3.0000	10.00000	419.5470
3.0025	10.01500	421.2345
3.0050	10.03002	422.9274
3.0075	10.04505	424.6259
3.0100	10.06010	426.3299
3.0125	10.07515	428.0394
3.0150	10.09022	429.7544
3.0175	10.10530	431.4750
3.0200	10.12040	433.2012
3.0225	10.13550	434.9329
3.0250	10.15062	436.6703
3.0275	10.16575	438.4133
3.0300	10.18090	440.1619
3.0325	10.19605	441.9161
3.0350	10.21122	443.6760
3.0375	10.22640	445.4416
3.0400	10.24160	447.2129
3.0425	10.25680	448.9898
3.0450	10.27202	450.7725
3.0475	10.28725	452.5609
3.0500	10.30250	454.3550
3.0525	10.31775	456.1549
3.0550	10.33302	457.9605
3.0575	10.34830	459.7719
3.0600	10.36360	461.5891
3.0625	10.37890	463.4122
3.0650	10.39422	465.2410
3.0675	10.40955	467.0757
3.0700	10.42490	468.9162
3.0725	10.44025	470.7626

Table 3 (Continued)

(b) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	$y_1 (= \delta_2)$	y_3
3.0750	10.45562	472.6149
3.0775	10.47100	474.4730
3.0800	10.48640	476.3371
3.0825	10.50180	478.2071
3.0850	10.51722	480.0830
3.0875	10.53265	481.9649
3.0900	10.54810	483.8527
3.0925	10.56355	485.7465
3.0950	10.57902	487.6463
3.0975	10.59450	489.5521
3.1000	10.61000	491.4639
3.1025	10.62550	493.3818
3.1050	10.64102	495.3057
3.1075	10.65655	497.2357
3.1100	10.67210	499.1717
3.1125	10.68765	501.1138
3.1150	10.70322	503.0621
3.1175	10.71880	505.0165
3.1200	10.73440	506.9770
3.1225	10.75000	508.9436
3.1250	10.76562	510.9164

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ	x_4	x_2
-.0150	-.1759503	.01500338
-.0200	-.1739792	.02000800
-.0250	-.1721243	.02501563
-.0300	-.1703837	.03002700
-.0350	-.1687649	.03504288
-.0400	-.1672430	.04006400
-.0450	-.1658431	.04509113
-.0500	-.1545426	.05012500
-.0550	-.1633549	.05516638
-.0600	-.1622792	.06021600
-.0650	-.1613063	.06527463
-.0700	-.1604361	.07034300
-.0750	-.1596749	.07542188
-.0800	-.1590147	.08051200
-.0850	-.1584578	.08561413
-.0900	-.1580049	.09072900
-.0950	-.1576522	.09585738
-.1000	-.1574009	.1010000
-.1050	-.1572505	.1061576
-.1100	-.1571997	.1113310
-.1150	-.1572486	.1165208
-.1200	-.1573961	.1217280
-.1250	-.1576430	.1269531
-.1300	-.1579882	.1321970
-.1350	-.1584323	.1374603
-.1400	-.1589739	.1427440
-.1450	-.1596137	.1480486
-.1500	-.1603509	.1533750
-.1550	-.1611860	.1587238
-.1600	-.1621188	.1640960
-.1650	-.1631494	.1694921
-.1700	-.1642781	.1749130
-.1750	-.1655045	.1803593
-.1800	-.1668291	.1858320
-.1850	-.1682522	.1913316
-.1900	-.1697738	.1968590
-.1950	-.1713941	.2024148
-.2000	-.1731141	.2080000
-.2050	-.1749335	.2136151
-.2100	-.1768529	.2192610
-.2150	-.1788731	.2249387
-.2200	-.1809942	.2306480
-.2250	-.1832169	.2363906
-.2300	-.1855420	.2421670
-.2350	-.1879700	2479778
-.2400	-.1905014	.2538240
-.2450	-.1931372	.2597061
-.2500	-.1958780	.2656250
-.2550	-.1987247	.2715813

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	x_4	x_2
-.2600	-.2016780	.2775760
-.2650	-.2047390	.2836096
-.2700	-.2079085	.2896830
-.2750	-.2111675	.2957968
-.2800	-.2145769	.3019520
-.2850	-.2180779	.3081491
-.2900	-.2216916	.3143890
-.2950	-.2254190	.3206723
-.3000	-.2292614	.3270000
-.3050	-.2332199	.3333726
-.3100	-.2372959	.3397910
-.3150	-.2414904	.3462558
-.3200	-.2458050	.3527680
-.3250	-.2502410	.3593281
-.3300	-.2547997	.3659370
-.3350	-.2594827	.3725953
-.3400	-.2642914	.3793040
-.3450	-.2692273	.3860636
-.3500	-.2742921	.3928750
-.3550	-.2794872	.3997388
-.3600	-.2848144	.4065560
-.3650	-.2902754	.4136271
-.3700	-.2958718	.4206530
-.3750	-.3016055	.4277343
-.3800	-.3074782	.4348720
-.3850	-.3134918	.4420666
-.3900	-.3196481	.4493190
-.3950	-.3259492	.4566298
-.4000	-.3323965	.4640000
-.4100	-.3457403	.4789210
-.4200	-.3596950	.4940880
-.4300	-.3742781	.5095070
-.4400	-.3895076	.5251840
-.4500	-.4054018	.5411250
-.4600	-.4219799	.5573350
-.4700	-.4392519	.5738230
-.4800	-.4572683	.5905920
-.4900	-.4760202	.6076490
-.5000	-.4955395	.6250000
-.5100	-.5158490	.6426510
-.5200	-.5369717	.6606080
-.5300	-.5589319	.6788770
-.5400	-.5817541	.6974040
-.5500	-.6054639	.7163750
-.5600	-.6300873	.7356160
-.5700	-.6556516	.7551930
-.5800	-.6821841	.7751120
-.5900	-.7097134	.7953790
-.6000	-.7382686	.8160000

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ	x_4	x_2
-.6100	-.7678798	.8369810
-.6200	-.7985777	.8583280
-.6300	-.8303937	.8800470
-.6400	-.8633604	.9021440
-.6500	-.8975107	.9246250
-.6600	-.9328788	.9474960
-.6700	-.9694993	.9707630
-.6800	-1.007408	.9944320
-.6900	-1.046641	1.018509
-.7000	-1.087236	1.043000
-.7100	-1.129232	1.067911
-.7200	-1.172666	1.093248
-.7300	-1.217580	1.119017
-.7400	-1.264015	1.145224
-.7500	-1.312011	1.171875
-.7600	-1.361611	1.198976
-.7700	-1.412860	1.226533
-.7800	-1.465802	1.254552
-.7900	-1.520482	1.283039
-.8000	-1.576947	1.312000
-.8100	-1.635245	1.341441
-.8200	-1.695423	1.371368
-.8300	-1.757531	1.401787
-.8400	-1.821620	1.432704
-.8500	-1.887741	1.464125
-.8600	-1.953946	1.496056
-.8700	-2.026290	1.528503
-.8800	-2.098826	1.561472
-.8900	-2.173611	1.594969
-.9000	-2.250701	1.629000
-.9100	-2.330153	1.663571
-.9200	-2.412027	1.698686
-.9300	-2.496383	1.734357
-.9400	-2.583282	1.770584
-.9500	-2.672785	1.807375
-.9600	-2.764957	1.844736
-.9700	-2.859862	1.882673
-.9800	-2.957565	1.921152
-.9900	-3.058134	1.960299
-1.0000	-3.161636	2.000000
-1.0100	-3.268140	2.040301
-1.0200	-3.377718	2.08[illegible]208

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ		x_4		x_2
.0125	-	.1889331	-	.01250195
.0150	-	.1902993	-	.01500338
.0175	-	.1916966	-	.01750536
.0200	-	.1931265	-	.02000800
.0225	-	.1945897	-	.02251139
.0250	-	.1960848	-	.02501563
.0275	-	.1976128	-	.02752080
.0300	-	.1991742	-	.03002700
.0325	-	.2007689	-	.03253433
.0350	-	.2023971	-	.03504288
.0375	-	.2040595	-	.03755273
.0400	-	.2057563	-	.04006400
.0425	-	.2074875	-	.04257677
.0450	-	.2092536	-	.04509113
.0475	-	.2110548	-	.04760717
.0500	-	.2128916	-	.05012500
.0525	-	.2147640	-	.05264470
.0550	-	.2166726	-	.05516638
.0575	-	.2186176	-	.05769011
.0600	-	.2205992	-	.06021600
.0625	-	.2226178	-	.06274414
.0650	-	.2246738	-	.06527463
.0675	-	.2267676	-	.06780755
.0700	-	.2288993	-	.07034300
.0725	-	.2310694	-	.07288108
.0750	-	.2332782	-	.07542188
.0775	-	.2355261	-	.07796548
.0800	-	.2378135	-	.08051200
.0825	-	.2401407	-	.08306152
.0850	-	.2425081	-	.08561413
.0875	-	.2449160	-	.08816992
.0900	-	.2473649	-	.09072500
.0925	-	.2498552	-	.09329145
.0950	-	.2523872	-	.09585736
.0975	-	.2549613	-	.09842656
.1000	-	.2575780	-	.1010000
.1025	-	.2602377	-	.1035768
.1050	-	.2629408	-	.1061576
.1075	-	.2656377	-	.1087423
.1100	-	.2684788	-	.1113310
.1125	-	.2713146	-	.1139238
.1150	-	.2741956	-	.1165206
.1175	-	.2771221	-	.1191222
.1200	-	.2800947	-	.1217260
.1225	-	.2831139	-	.1243382
.1250	-	.2861799	-	.1269531
.1275	-	.2892935	-	.1295726
.1300	-	.2924550	-	.1321970
.1325	-	.2956649	-	.1348262

Table 3 (Continued)

(c) $-1.0200 < \xi \leqslant 3.1250$

ξ		x_4		x_2
.1350	-	.2989237	-	.1374603
.1375	-	.3022320	-	.1400996
.1400	-	.3055903	-	.1427440
.1425	-	.3089989	-	.1453936
.1450	-	.3124586	-	.1480486
.1475	-	.3159698	-	.1507090
.1500	-	.3195331	-	.1533750
.1525	-	.3231489	-	.1560465
.1550	-	.3268179	-	.1587238
.1575	-	.3305407	-	.1614069
.1600	-	.3343177	-	.1640960
.1625	-	.3381496	-	.1667910
.1650	-	.3420369	-	.1694921
.1675	-	.3459803	-	.1721994
.1700	-	.3499802	-	.1749130
.1725	-	.3540374	-	.1776329
.1750	-	.3581525	-	.1803593
.1775	-	.3623261	-	.1830923
.1800	-	.3665587	-	.1858320
.1825	-	.3708511	-	.1885783
.1850	-	.3752038	-	.1913316
.1875	-	.3796176	-	.1940918
.1900	-	.3840931	-	.1968590
.1925	-	.3886307	-	.1996333
.1950	-	.3932318	-	.2024148
.1975	-	.3978964	-	.2052037
.2000	-	.4026255	-	.2080000
.2025	-	.4074196	-	.2108037
.2050	-	.4122796	-	.2136151
.2075	-	.4172061	-	.2164341
.2100	-	.4222000	-	.2192610
.2125	-	.4272618	-	.2220957
.2150	-	.4323924	-	.2249383
.2175	-	.4375926	-	.2277891
.2200	-	.4428630	-	.2306480
.2225	-	.4482045	-	.2335151
.2250	-	.4536178	-	.2363906
.2275	-	.4591038	-	.2392745
.2300	-	.4646632	-	.2421670
.2325	-	.4702968	-	.2450680
.2350	-	.4760055	.	.2479778
.2375	-	.4817901	-	.2508961
.2400	-	.4876515	-	.2538240
.2425	-	.4935905	-	.2567605
.2450	-	.4996079	-	.2597061
.2475	-	.5057046	-	.2626609
.2500	-	.5118815	-	.2656250
.2525	-	.5181395	-	.2685984
.2550	-	.5244735	-	.2715813

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ		x_4		x_2
.2575	-	.5309024	-	.[illegible]745738
.2600	-	.5374091	-	.2775760
.2625	-	.5440006	-	.2805878
.2650	-	.5506778	-	.2836096
.2675	-	.5574416	-	.2866413
.2700	-	.5642930	-	.2896830
.2725	-	.5712331	-	.2927348
.2750	-	.5782627	-	.2957968
.2775	-	.5853828	-	.2988692
.2800	-	.5925945	-	.3019520
.2825	-	.5998989	-	.3050452
.2850	-	.6072968	-	.3081491
.2875	-	.6147895	-	.3112636
.2900	-	.6223778	-	.3143890
.2925	-	.6300629	-	.3175252
.2950	-	.6378460	-	.3206723
.2975	-	.6457279	-	.3238306
.3000	-	.6537099	-	.3270000
.3025	-	.6617931	-	.3301806
.3050	-	.6699785	-	.3333726
.3075	-	.6782674	-	.3365760
.3100	-	.6866609	-	.3397910
.3125	-	.6951601	-	.3430175
.3150	-	.7037663	-	.3462558
.3175	-	.7124805	-	.3495059
.3200	-	.7213040	-	.3527680
.3225	-	.7302381	-	.3560420
.3250	-	.7392839	-	.3593281
.3275	-	.7484426	-	.3626204
.3300	-	.7577156	-	.3659370
.3325	-	.7671042	-	.3692599
.3350	-	.7766095	-	.3725953
.3375	-	.7862328	-	.3759433
.3400	-	.7959756	-	.3793040
.3425	-	.8058390	-	.3826773
.3450	-	.8158245	-	.3860636
.3475	-	.8259334	-	.3894623
.3500	-	.8361670	-	.3928750
.3525	-	.8465267	-	.3963003
.3550	-	.8570139	-	.3997388
.3575	-	.8676301	-	.403190[illegible]
.3600	-	.8783766	-	.4066500
.3625	-	.8892549	-	.4101347
.3650	-	.9002664	-	.4136271
.3675	-	.9114126	-	.4171331
.3700	-	.9226949	-	.4206530
.3725	-	.9341149	-	.4241867
.3750	-	.9456741	-	.4277343
.3775	-	.9573740	-	.4312961

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ	x_4	x_2
.3800	.9692162	.4348720
.3825	.9812021	.4384621
.3850	.9933334	.4420666
.3875	1.005611	.4456855
.3900	1.018038	.4493190
.3925	1.030615	.4529670
.3950	1.043344	.4566298
.3975	1.056226	.4603074
.4000	1.069264	.4640000
.4025	1.082458	.4677075
.4050	1.095811	.4714301
.4075	1.109324	.4751679
.4100	1.122999	.4789210
.4125	1.136838	.4826894
.4150	1.150843	.4864733
.4175	1.165014	.4902728
.4200	1.179355	.4940880
.4225	1.193867	.4979188
.4250	1.208552	.5017656
.4275	1.223411	.5056283
.4300	1.238447	.5095070
.4325	1.253661	.5134018
.4350	1.269056	.5173128
.4375	1.284633	.5212402
.4400	1.300394	.5251840
.4425	1.316342	.5291442
.4450	1.332477	.5331211
.4475	1.348803	.5371146
.4500	1.365321	.5411250
.4525	1.382034	.5451522
.4550	1.398943	.5491963
.4575	1.416050	.5532576
.4600	1.433358	.5573360
.4625	1.450869	.5614316
.4650	1.468584	.5655440
.4675	1.486507	.5696750
.4700	1.504639	.5738230
.4725	1.522982	.5779885
.4750	1.541539	.5821718
.4775	1.560312	.5863729
.4800	1.579303	.5905920
.4825	1.598514	.5948290
.4850	1.617949	.5990841
.4875	1.637608	.6033574
.4900	1.657495	.6076490
.4925	1.677612	.6119589
.4950	1.697962	.6162873
.4975	1.718540	.6206343
.5000	1.739367	.6250000

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ		x_4		x_2
.5025	-	1.760428	-	.6293843
.5050	-	1.781731	-	.6337876
.5075	-	1.803279	-	.6382098
.5100	-	1.825074	-	.6426510
.5125	-	1.847119	-	.6471113
.5150	-	1.869417	-	.6515908
.5175	-	1.891969	-	.6560897
.5200	-	1.914779	-	.6606080
.5225	-	1.937849	-	.6651457
.5250	-	1.961182	-	.6697031
.5275	-	1.984781	-	.6742801
.5300	-	2.008649	-	.6788770
.5325	-	2.032787	-	.6834937
.5350	-	2.057200	-	.6881303
.5375	-	2.081889	-	.6927871
.5400	-	2.106858	-	.6974640
.5425	-	2.132109	-	.7021611
.5450	-	2.157646	-	.7068786
.5475	-	2.183471	-	.7116165
.5500	-	2.209587	-	.7163750
.5525	-	2.235998	-	.7211540
.5550	-	2.262705	-	.7259538
.5575	-	2.289713	-	.7307744
.5600	-	2.317024	-	.7356160
.5625	-	2.344641	-	.7404785
.5650	-	2.372568	-	.7453621
.5675	-	2.400807	-	7502669
.5700	-	2.429362	-	7551930
.5725	-	2.458235	-	7601404
.5750	-	2.487431	-	7651093
.5775	-	2.516952	-	7700998
.5800	-	2.546801	-	7751120
.5825	-	2.576982	-	7801458
.5850	-	2.607499	-	7852016
.5875	-	2.638354	-	7902793
.5900	-	2.669550	-	7953790
.5925	-	2.701092	-	8005008
.5950	-	2.732983	-	8056448
.5975	-	2.765226	-	8108112
.6000	-	2.797824	-	8160000
.6025	-	2.830782	-	8212112
.6050	-	2.864102	-	8264451
.6075	-	2.897788	-	8317016
.6100	-	2.931845	-	8369810
.6125	-	2.966275	-	8422832
.6150	-	3.001082	-	8476083
.6175	-	3.036271	-	8529566
.6200	-	3.071844	-	8583280
.6225	-	3.107805	-	8637226

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ		x_4		x_2
.6250	-	3.144158	-	8691406
.6275	-	3.180908	-	8715820
.6300	-	3.218058	-	8800470
.6325	-	3.255611	-	8855355
.6350	-	3.293572	-	8910478
.6375	-	3.331945	-	8965839
.6400	-	3.370734	-	9021440
.6425	-	3.409942	-	9077280
.6450	-	3.449574	-	9133361
.6475	-	3.489634	-	9189684
.6500	-	3.530127	-	9246250
.6525	-	3.571055	-	9303059
.6550	-	3.612423	-	9360113
.6575	-	3.654237	-	9417413
.6600	-	3.696499	-	9474960
.6625	-	3.739214	-	9532753
.6650	-	3.782387	-	9590796
.6675	-	3.826021	-	9649088
.6700	-	3.870122	-	9707630
.6725	-	3.914694	-	9766423
.6750	-	3.959740	-	9825468
.6775	-	4.005267	-	9884767
.6800	-	4.051278	-	9944320
.6825	-	4.097777	-	1.000412
.6850	-	4.144770	-	1.006419
.6875	-	4.192261	-	1.012451
.6900	.	4.240255	-	1.018509
.6925	-	4.288756	-	1.024592
.6950	-	4.337770	-	1.030702
.6975	-	4.387301	-	1.036838
.7000	-	4.437354	-	1.043000
.7025	-	4.487933	-	1.049188
.7050	-	4.539045	-	1.055402
.7075	-	4.590693	-	1.061643
.7100	-	4.642883	-	1.067911
.7125	-	4.695619	-	1.074205
.7150	-	4.748908	-	1.080525
.7175	-	4.802753	-	1.086873
.7200	-	4.857161	-	1.093240
.7225	-	4.912135	-	1.099649
.7250	-	4.967683	-	1.106078
.7275	-	5.023808	-	1.112533
.7300	-	5.080516	-	1.119017
.7325	-	5.137813	-	1.125527
.7350	-	5.195704	-	1.132065
.7375	-	5.254194	-	1.138630
.7400	-	5.313289	-	1.145224
.7425	-	5.372995	-	1.151844
.7450	-	5.433316	-	1.158493

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ		x_4		x_2
.7475	-	5.494259	-	1.165170
.7500	-	5.555829	-	1.171875
.7525	-	5.618032	-	1.178607
.7550	-	5.680874	-	1.185368
.7575	-	5.744360	-	1.192158
.7600	-	5.808496	-	1.198976
.7625	-	5.873289	-	1.205822
.7650	-	5.938743	-	1.212697
.7675	-	6.004866	-	1.219600
.7700	-	6.071663	-	1.226533
.7725	-	6.139139	-	1.233494
.7750	-	6.207303	-	1.240484
.7775	-	6.276158	-	1.247503
.7800	-	6.345712	-	1.254552
.7825	-	6.415970	-	1.261629
.7850	-	6.486940	-	1.268736
.7875	-	6.558627	-	1.275873
.7900	-	6.631037	-	1.283039
.7925	-	6.704178	-	1.290234
.7950	-	6.778056	-	1.297459
.7975	-	6.852676	-	1.304714
.8000	-	6.928047	-	1.312000
.8025	-	7.004173	-	1.319315
.8050	-	7.081063	-	1.326660
.8075	-	7.158722	-	1.334035
.8100	-	7.237158	-	1.341441
.8125	-	7.316377	-	1.348876
.8150	-	7.396386	-	1.356343
.8175	-	7.477192	-	1.363640
.8200	-	7.558802	-	1.371368
.8225	-	7.641223	-	1.378926
.8250	-	7.724463	-	1.386515
.8275	-	7.808527	-	1.394135
.8300	-	7.893423	-	1.401787
.8325	-	7.979159	-	1.409469
.8350	-	8.065742	-	1.417182
.8375	-	8.153179	-	1.424927
.8400	-	8.241475	-	1.432704
.8425	-	8.330645	-	1.440511
.8450	-	8.420688	-	1.448351
.8475	-	8.511616	-	1.456222
.8500	-	8.603435	-	1.464125
.8525	-	8.696153	-	1.472059
.8550	-	8.789777	-	1.480026
.8575	-	8.884317	-	1.488025
.8600	-	8.979778	-	1.496056
.8625	-	9.076170	-	1.504119
.8650	-	9.173499	-	1.512214
.8675	-	9.271775	-	1.520342

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	x_4	x_2
.8700	- 9.371004	- 1.528503
.8725	- 9.471196	- 1.536696
.8750	- 9.572358	- 1.544921
.8775	- 9.674498	- 1.553160
.8800	- 9.777625	- 1.561472
.8825	- 9.881747	- 1.569796
.8850	- 9.986872	- 1.578134
.8875	- 10.09300	- 1.586544
.8900	- 10.20016	- 1.594969
.8925	- 10.30835	- 1.603426
.8950	- 10.41757	- 1.611917
.8975	- 10.52784	- 1.620441
.9000	- 10.63916	- 1.629000
.9025	- 10.75155	- 1.637591
.9050	- 10.86501	- 1.646217
.9075	- 10.97955	- 1.654877
.9100	- 11.09518	- 1.663571
.9125	- 11.21190	- 1.672298
.9150	- 11.32974	- 1.681060
.9175	- 11.44869	- 1.689857
.9200	- 11.56877	- 1.698688
.9225	- 11.68999	- 1.707553
.9250	- 11.81235	- 1.716453
.9275	- 11.93587	- 1.725387
.9300	- 12.06054	- 1.734357
.9325	- 12.18640	- 1.743361
.9350	- 12.31343	- 1.752400
.9375	- 12.44166	- 1.761474
.9400	- 12.57109	- 1.770584
.9425	- 12.70173	- 1.779728
.9450	- 12.83359	- 1.788908
.9475	- 12.96668	- 1.798124
.9500	- 13.10102	- 1.807375
.9525	- 13.23660	- 1.816651
.9550	- 13.37345	- 1.825983
.9575	- 13.51157	- 1.835441
.9600	- 13.65097	- 1.844736
.9625	- 13.79167	- 1.854166
.9650	- 13.93366	- 1.863632
.9675	- 14.07697	- 1.873134
.9700	- 14.22160	1.882673
.9725	- 14.36757	- 1.892247
.9750	- 14.51488	- 1.901859
.9775	- 14.66355	- 1.911507
.9800	- 14.81358	- 1.921192
.9825	- 14.96499	- 1.930913
.9850	- 15.11778	- 1.940671
.9875	- 15.27198	- 1.950466
.9900	- 15.42758	- 1.960299

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ	x_4	x_2
.9925	-15.58461	-1.970168
.9950	-15.74306	-1.980074
.9975	-15.90296	-1.990018
1.0000	-16.06432	-2.000000
1.0025	-16.22714	-2.010018
1.0050	-16.39143	-2.020075
1.0075	-16.55722	-2.030169
1.0100	-16.72450	-2.040301
1.0125	-16.89330	-2.050470
1.0150	-17.06362	-2.060678
1.0175	-17.23548	-2.070924
1.0200	-17.40888	-2.081208
1.0225	-17.58385	-2.091530
1.0250	-17.76038	-2.101890
1.0275	-17.93850	-2.112289
1.0300	-18.11822	-2.122727
1.0325	-18.29954	-2.133203
1.0350	-18.48248	-2.143717
1.0375	-18.66706	-2.154271
1.0400	-18.85328	-2.164864
1.0425	-19.04116	-2.175495
1.0450	-19.23071	-2.186166
1.0475	-19.42194	-2.196875
1.0500	-19.61487	-2.207625
1.0525	-19.80950	-2.218413
1.0550	-20.00586	-2.229241
1.0575	-20.20396	-2.240108
1.0600	-20.40380	-2.251016
1.0625	-20.60540	-2.261962
1.0650	-20.80878	-2.272949
1.0675	-21.01394	-2.283976
1.0700	-21.22091	-2.295043
1.0725	-21.42969	-2.306149
1.0750	-21.64030	-2.317296
1.0775	-21.85275	-2.328484
1.0800	-22.06706	-2.339712
1.0825	-22.28324	-2.350980
1.0850	-22.50130	-2.362289
1.0875	-22.72126	-2.373638
1.0900	-22.94313	-2.385029
1.0925	-23.16692	-2.396460
1.0950	-23.39266	-2.407932
1.0975	-23.62035	-2.419445
1.1000	-23.85001	-2.431000
1.1025	-24.08165	-2.442595
1.1050	-24.31529	-2.454232
1.1075	-24.55095	-2.465911
1.1100	-24.78863	-2.477631
1.1125	-25.02835	-2.489392

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ	x_4	x_2
1.1150	-25.27013	-2.501195
1.1175	-25.51399	-2.513040
1.1200	-25.75993	-2.524928
1.1225	-26.00797	-2.536857
1.1250	-26.25813	-2.548828
1.1275	-26.51043	-2.560841
1.1300	-26.76487	-2.572897
1.1325	-27.02148	-2.584994
1.1350	-27.28027	-2.597135
1.1375	-27.54125	-2.609318
1.1400	-27.80445	-2.621544
1.1425	-28.06987	-2.633812
1.1450	-28.33754	-2.646123
1.1475	-28.60747	-2.658477
1.1500	-28.87967	-2.670875
1.1525	-29.15417	-2.683315
1.1550	-29.43097	-2.695798
1.1575	-29.71010	-2.708325
1.1600	-29.99158	-2.720896
1.1625	-30.27541	-2.733509
1.1650	-30.56161	-2.746167
1.1675	-30.85021	-2.758868
1.1700	-31.14122	-2.771613
1.1725	-31.43465	-2.784401
1.1750	-31.73052	-2.797234
1.1775	-32.02886	-2.810111
1.1800	-32.32968	-2.823032
1.1825	-32.63299	-2.835997
1.1850	-32.93881	-2.849006
1.1875	-33.24716	-2.862060
1.1900	-33.55806	-2.875159
1.1925	-33.87153	-2.888302
1.1950	-34.18758	-2.901489
1.1975	-34.50624	-2.914722
1.2000	-34.87751	-2.928000
1.2025	-35.15143	-2.941322
1.2050	-35.47799	-2.954690
1.2075	-35.80724	-2.968102
1.2100	-36.13918	-2.981561
1.2125	-36.47383	-2.995064
1.2150	-36.81121	-3.008613
1.2175	-37.15134	-3.022207
1.2200	-37.49424	-3.035848
1.2225	-37.83993	-3.049533
1.2250	-38.18843	-3.063265
1.2275	-38.53975	-3.077043
1.2300	-38.89392	-3.090867
1.2325	-39.25096	-3.104736
1.2350	-39.61087	-3.118652

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	x_4	x_2
1.2375	-39.97370	-3.132615
1.2400	-40.33945	-3.146624
1.2425	-40.70814	-3.160679
1.2450	-41.07979	-3.174781
1.2475	-41.45443	-3.188929
1.2500	-41.83208	-3.203125
1.2525	-42.21275	-3.217367
1.2550	-42.59646	-3.231656
1.2575	-42.98324	-3.245992
1.2600	-43.37311	-3.260376
1.2625	-43.76609	-3.274806
1.2650	-44.16219	-3.289284
1.2675	-44.56144	-3.303810
1.2700	-44.96386	-3.318383
1.2725	-45.36948	-3.333003
1.2750	-45.77830	-3.347671
1.2775	-46.19037	-3.362387
1.2800	-46.60568	-3.377152
1.2825	-47.02428	-3.391964
1.2850	-47.44617	-3.406824
1.2875	-47.87138	-3.421732
1.2900	-48.29994	-3.436689
1.2925	-48.73186	-3.451693
1.2950	-49.16717	-3.466747
1.2975	-49.60589	-3.481849
1.3000	-50.04804	-3.497000
1.3025	-50.49365	-3.512199
1.3050	-50.94273	-3.527447
1.3075	-51.39532	-3.542744
1.3100	-51.85143	-3.558091
1.3125	-52.31108	-3.573486
1.3150	-52.77430	-3.588930
1.3175	-53.24112	-3.604424
1.3200	-53.71155	-3.619968
1.3225	-54.18562	-3.635560
1.3250	-54.66336	-3.651203
1.3275	-55.14478	-3.666695
1.3300	-55.62991	-3.682637
1.3325	-56.11878	-3.698428
1.3350	-56.61141	-3.714270
1.3375	-57.10782	-3.730162
1.3400	-57.60804	-3.746104
1.3425	-58.11209	-3.762096
1.3450	-58.62000	-3.778138
1.3475	-59.13179	-3.794231
1.3500	-59.64745	-3.810375
1.3525	-60.16711	-3.826560
1.3550	-60.69069	-3.842813
1.3575	-61.21826	-3.859109

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	x_4	x_2
1.3600	- 61.74983	- 3.875456
1.3625	- 62.28544	- 3.891853
1.3650	- 62.82510	- 3.908302
1.3675	- 63.36885	- 3.924801
1.3700	- 63.91671	- 3.941353
1.3725	- 64.46870	- 3.957955
1.3750	- 65.02486	- 3.974609
1.3775	- 65.58520	- 3.991314
1.3800	- 66.14976	- 4.008072
1.3825	- 66.71856	- 4.024880
1.3850	- 67.29163	- 4.041741
1.3875	- 67.86900	- 4.058654
1.3900	- 68.45068	- 4.075619
1.3925	- 69.03672	- 4.092635
1.3950	- 69.62713	- 4.109704
1.3975	- 70.22194	- 4.126826
1.4000	- 70.82119	- 4.144000
1.4025	- 71.42489	- 4.161226
1.4050	- 72.03308	- 4.178505
1.4075	- 72.64578	- 4.195836
1.4100	- 73.26303	- 4.213221
1.4125	- 73.88405	- 4.230658
1.4150	- 74.51126	- 4.248148
1.4175	- 75.14230	- 4.265691
1.4200	- 75.77800	- 4.283288
1.4225	- 76.41838	- 4.300937
1.4250	- 77.06347	- 4.318640
1.4275	- 77.71331	- 4.336397
1.4300	- 78.36792	- 4.354207
1.4325	- 79.02732	- 4.372070
1.4350	- 79.69156	- 4.389987
1.4375	- 80.36065	- 4.407958
1.4400	- 81.03464	- 4.425984
1.4425	- 81.71354	- 4.444063
1.4450	- 82.39739	- 4.462196
1.4475	- 83.08622	- 4.480383
1.4500	- 83.78006	- 4.498625
1.4525	- 84.47894	- 4.516920
1.4550	- 85.18289	- 4.535271
1.4575	- 85.89193	- 4.553676
1.4600	- 86.60611	- 4.572136
1.4625	- 87.32545	- 4.590650
1.4650	- 88.04999	- 4.609219
1.4675	- 88.77975	- 4.627843
1.4700	- 89.51476	- 4.646523
1.4725	- 90.25506	- 4.665257
1.4750	- 91.00068	- 4.684046
1.4775	- 91.75166	- 4.702891
1.4800	- 92.50801	- 4.721792

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	x_4	x_3
1.4825	-93.26978	-4.740747
1.4850	-94.03700	-4.759759
1.4875	-94.80969	-4.778826
1.4900	-95.58790	-4.797949
1.4925	-96.37166	-4.817127
1.4950	-97.16099	-4.836362
1.4975	-97.95593	-4.855653
1.5000	-98.75652	-4.875000
1.5025	-99.56278	-4.894403
1.5050	-100.3747	-4.913862
1.5075	-101.1924	-4.933378
1.5100	-102.0159	-4.952951
1.5125	-102.8452	-4.972580
1.5150	-103.6804	-4.992265
1.5175	-104.5214	-5.012008
1.5200	-105.3684	-5.031808
1.5225	-106.2213	-5.051664
1.5250	-107.0802	-5.071578
1.5275	-107.9451	-5.091548
1.5300	-108.8160	-5.111577
1.5325	-109.6931	-5.131662
1.5350	-110.5763	-5.151805
1.5375	-111.4656	-5.172005
1.5400	-112.3611	-5.192264
1.5425	-113.2629	-5.212579
1.5450	-114.1709	-5.232953
1.5475	-115.0853	-5.253385
1.5500	-116.0059	-5.273875
1.5525	-116.9330	-5.294422
1.5550	-117.8665	-5.315028
1.5575	-118.8064	-5.335693
1.5600	-119.7528	-5.356416
1.5625	-120.7057	-5.377197
1.5650	-121.6652	-5.398037
1.5675	-122.6313	-5.418935
1.5700	-123.6040	-5.439893
1.5725	-124.5834	-5.460909
1.5750	-125.5695	-5.481984
1.5775	-126.5624	-5.503110
1.5800	-127.5620	-5.524312
1.5825	-128.5685	-5.545564
1.5850	-129.5819	-5.566876
1.5875	-130.6021	-5.588248
1.5900	-131.6293	-5.609679
1.5925	-132.6635	-5.631169
1.5950	-133.7047	-5.652719
1.5975	-134.7530	-5.674329
1.6000	-135.8083	-5.696000
1.6025	-136.8708	-5.717730

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	x_4	$\bar{x}_3$
1.6050	−137.9405	−5.739520
1.6075	−139.0174	−5.761370
1.6100	−140.1016	−5.783281
1.6125	−141.1931	−5.805251
1.6150	−142.2919	−5.827283
1.6175	−143.3981	−5.849375
1.6200	−144.5118	−5.871528
1.6225	−145.6328	−5.893741
1.6250	−146.7615	−5.916015
1.6275	−147.8976	−5.938350
1.6300	−149.0414	−5.960747
1.6325	−150.1927	−5.983204
1.6350	−151.3518	−6.005722
1.6375	−152.5186	−6.028302
1.6400	−153.6931	−6.050944
1.6425	−154.8754	−6.073646
1.6450	−156.0656	−6.096411
1.6475	−157.2637	−6.119237
1.6500	−158.4697	−6.142125
1.6525	−159.6837	−6.165074
1.6550	−160.9057	−6.188086
1.6575	−162.1357	−6.211160
1.6600	−163.3739	−6.234296
1.6625	−164.6202	−6.257494
1.6650	−165.8747	−6.280754
1.6675	−167.1375	−6.304077
1.6700	−168.4085	−6.327463
1.6725	−169.6879	−6.350911
1.6750	−170.9756	−6.374421
1.6775	−172.2718	−6.397995
1.6800	−173.5764	−6.421632
1.6825	−174.8896	−6.445331
1.6850	−176.2113	−6.469094
1.6875	−177.5416	−6.492919
1.6900	−178.8805	−6.516809
1.6925	−180.2281	−6.540761
1.6950	−181.5845	−6.564777
1.6975	−182.9497	−6.588856
1.7000	−184.4237	−6.613000
1.7025	−185.7066	−6.637205
1.7050	−187.0984	−6.661477
1.7075	−188.4992	−6.685812
1.7100	−189.9090	−6.710211
1.7125	−191.3279	−6.734673
1.7150	−192.7560	−6.759200
1.7175	−194.1932	−6.783792
1.7200	−195.6396	−6.808448
1.7225	−197.0952	−6.833168
1.7250	−198.5602	−6.857953

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	x_4	x_2
1.7275	-200.0346	-6.882802
1.7300	-201.5184	-6.907717
1.7325	-203.0116	-6.932696
1.7350	-204.5144	-6.957740
1.7375	-206.0267	-6.982849
1.7400	-207.5486	-7.008024
1.7425	-209.0802	-7.033263
1.7450	-210.6215	-7.058568
1.7475	-212.1726	-7.083939
1.7500	-213.7335	-7.109375
1.7525	-215.3042	-7.134876
1.7550	-216.8849	-7.160443
1.7575	-218.4756	-7.186076
1.7600	-220.0762	-7.211776
1.7625	-221.6870	-7.237541
1.7650	-223.3079	-7.263372
1.7675	-224.9389	-7.289269
1.7700	-226.5802	-7.315233
1.7725	-228.2318	-7.341262
1.7750	-229.8937	-7.367359
1.7775	-231.5660	-7.393522
1.7800	-233.2487	-7.419752
1.7825	-234.9420	-7.446048
1.7850	-236.6458	-7.472411
1.7875	-238.3602	-7.498841
1.7900	-240.0852	-7.525339
1.7925	-241.8210	-7.551903
1.7950	-243.5676	-7.578534
1.7975	-245.3249	-7.605233
1.8000	-247.0932	-7.632000
1.8025	-248.8724	-7.658833
1.8050	-250.6625	-7.685735
1.8075	-252.4538	-7.712704
1.8100	-254.2761	-7.739741
1.8125	-256.0996	-7.766845
1.8150	-257.9343	-7.794018
1.8175	-259.7802	-7.821259
1.8200	-261.6375	-7.848568
1.8225	-263.5062	-7.875945
1.8250	-265.3863	-7.903390
1.8275	-267.2780	-7.930904
1.8300	-269.1812	-7.958487
1.8325	-271.0960	-7.986138
1.8350	-273.0224	-8.013857
1.8375	-274.9607	-8.041646
1.8400	-276.9107	-8.069504
1.8425	-278.8725	-8.097430
1.8450	-280.8463	-8.125426
1.8475	-282.8320	-8.153490

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ	x_4	x_3
1.8500	-284.8298	-8.181625
1.8525	-286.8396	-8.209828
1.8550	-288.8616	-8.238101
1.8575	-290.8958	-8.266443
1.8600	-292.9423	-8.294856
1.8625	-295.0011	-8.323337
1.8650	-297.0723	-8.351889
1.8675	-299.1560	-8.380511
1.8700	-301.2521	-8.409203
1.8725	-303.3609	-8.437964
1.8750	-305.4822	-8.466796
1.8775	-307.6163	-8.495699
1.8800	-309.7632	-8.524672
1.8825	-311.9228	-8.553715
1.8850	-314.0954	-8.582829
1.8875	-316.2809	-8.612013
1.8900	-318.4794	-8.641269
1.8925	-320.6910	-8.670595
1.8950	-322.9157	-8.699992
1.8975	-325.1537	-8.729460
1.9000	-327.4049	-8.759000
1.9025	-329.6694	-8.788610
1.9050	-331.9473	-8.818292
1.9075	-334.2387	-8.848046
1.9100	-336.5437	-8.877871
1.9125	-338.8622	-8.907767
1.9150	-341.1944	-8.937735
1.9175	-343.5403	-8.967775
1.9200	-345.9000	-8.997888
1.9225	-348.2736	-9.028072
1.9250	-350.6610	-9.058328
1.9275	-353.0625	-9.088656
1.9300	-355.4780	-9.119057
1.9325	-357.9077	-9.149529
1.9350	-360.3516	-9.180075
1.9375	-362.8097	-9.210693
1.9400	-365.2821	-9.241384
1.9425	-367.7690	-9.272147
1.9450	-370.2703	-9.302983
1.9475	-372.7861	-9.333892
1.9500	-375.3166	-9.364875
1.9525	-377.8617	-9.395930
1.9550	-380.4216	-9.427058
1.9575	-382.9963	-9.458260
1.9600	-385.5858	9.489536
1.9625	-388.1904	-9.520884
1.9650	-390.8099	-9.552307
1.9675	-393.4446	-9.583803
1.9700	-396.0944	-9.615373

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ	x_4	x_2
1.9725	-398.7594	-9.647016
1.9750	-401.4398	-9.678734
1.9775	-404.1355	-9.710526
1.9800	-406.8467	-9.742392
1.9825	-409.5734	-9.774332
1.9850	-412.3158	-9.806346
1.9875	-415.0738	-9.838435
1.9900	-417.8475	-9.870599
1.9925	-420.6371	-9.902837
1.9950	-423.4425	-9.935140
1.9975	-426.2640	-9.967537
2.0000	-429.1014	-10.00000
2.0025	-431.9550	-10.03253
2.0050	-434.8248	-10.06515
2.0075	-437.7108	-10.09783
2.0100	-440.6132	-10.13060
2.0125	-443.5320	-10.16343
2.0150	-446.4673	-10.19635
2.0175	-449.4191	-10.22934
2.0200	-452.3876	-10.26240
2.0225	-455.3728	-10.29554
2.0250	-458.3749	-10.32876
2.0275	-461.3938	-10.36205
2.0300	-464.4296	-10.39542
2.0325	-467.4825	-10.42887
2.0350	-470.5525	-10.46239
2.0375	-473.6397	-10.49599
2.0400	-476.7441	-10.52966
2.0425	-479.8659	-10.56341
2.0450	-483.0051	-10.59724
2.0475	-486.1619	-10.63114
2.0500	-489.3362	-10.66512
2.0525	-492.5281	-10.69918
2.0550	-495.7378	-10.73331
2.0575	-498.9654	-10.76752
2.0600	-502.2108	-10.80181
2.0625	-505.4742	-10.83618
2.0650	-508.7557	-10.87062
2.0675	-512.0554	-10.90514
2.0700	-515.3732	10.93974
2.0725	-518.7094	10.97441
2.0750	-522.0640	-11.00917
2.0775	-525.4371	-11.04400
2.0800	-528.8287	-11.07891
2.0825	-532.2389	-11.11389
2.0850	-535.6679	-11.14896
2.0875	-539.1157	-11.18410
2.0900	-542.5824	-11.21932
2.0925	-546.0681	-11.25462

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	x_4	x_2
2.0950	-549.5729	-11.29000
2.0975	-553.0958	-11.32546
2.1000	-556.6399	-11.36100
2.1025	-560.2024	-11.39661
2.1050	-563.7842	-11.43230
2.1075	-567.3856	-11.46807
2.1100	-571.0065	-11.50393
2.1125	-574.6471	-11.53986
2.1150	-578.3075	-11.57587
2.1175	-581.9877	-11.61195
2.1200	-585.6878	-11.64812
2.1225	-589.4079	-11.68437
2.1250	-593.1482	-11.72070
2.1275	-596.9086	-11.75711
2.1300	-600.6894	-11.79359
2.1325	-604.4905	-11.83016
2.1350	-608.3120	-11.86681
2.1375	-612.1541	-11.90353
2.1400	-616.0169	-11.94034
2.1425	-619.9004	-11.97723
2.1450	-623.8047	-12.01419
2.1475	-627.7299	-12.05124
2.1500	-631.6761	-12.08837
2.1525	-635.6434	-12.12558
2.1550	-639.6319	-12.16287
2.1575	-643.6417	-12.20024
2.1600	-647.6729	-12.23769
2.1625	-651.7255	-12.27522
2.1650	-655.7997	-12.31284
2.1675	-659.8955	-12.35053
2.1700	-664.0131	-12.38831
2.1725	-668.1525	-12.42617
2.1750	-672.3138	-12.46410
2.1775	-676.4972	-12.50212
2.1800	-680.7027	-12.54023
2.1825	-684.9304	-12.57841
2.1850	-689.1805	-12.61668
2.1875	-693.4529	-12.65502
2.1900	-697.7478	-12.69345
2.1925	-702.0654	-12.73197
2.1950	-706.4056	-12.77056
2.1975	-710.7687	-12.80924
2.2000	-715.1546	-12.84800
2.2025	-719.5635	-12.88684
2.2050	-723.9955	-12.92576
2.2075	-728.4508	-12.96477
2.2100	-732.9292	-13.00386
2.2125	-737.4311	-13.04303
2.2150	-741.9565	-13.08229

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	x_4	x_2
2.2175	-746.5054	-13.12162
2.2200	-751.0781	-13.16104
2.2225	-755.6745	-13.20055
2.2250	-760.2948	-13.24014
2.2275	-764.9390	-13.27981
2.2300	-769.6074	-13.31956
2.2325	-774.3000	-13.35940
2.2350	-779.0168	-13.39932
2.2375	-783.7581	-13.43933
2.2400	-788.5238	-13.47942
2.2425	-793.3142	-13.51959
2.2450	-798.1292	-13.55985
2.2475	-802.9690	-13.60019
2.2500	-807.8338	-13.64062
2.2525	-812.7236	-13.68113
2.2550	-817.6385	-13.72173
2.2575	-822.5786	-13.76241
2.2600	-827.5440	-13.80317
2.2625	-832.5349	-13.84402
2.2650	-837.5513	-13.88495
2.2675	-842.5933	-13.92597
2.2700	-847.6611	-13.96708
2.2725	-852.7548	-14.00827
2.2750	-857.8744	-14.04954
2.2775	-863.0202	-14.09090
2.2800	-868.1920	-14.13235
2.2825	-873.3902	-14.17388
2.2850	-878.6148	-14.21549
2.2875	-883.8659	-14.25720
2.2900	-889.1436	-14.29898
2.2925	-894.4480	-14.34086
2.2950	-899.7793	-14.38282
2.2975	-905.1375	-14.42486
2.3000	-910.5228	-14.46700
2.3025	-915.9352	-14.50921
2.3050	-921.3749	-14.55152
2.3075	-926.8420	-14.59391
2.3100	-932.3366	-14.63639
2.3125	-937.8588	-14.67895
2.3150	-943.4088	-14.72160
2.3175	-948.9866	-14.76434
2.3200	-954.5923	-14.80716
2.3225	-960.2261	-14.85007
2.3250	-965.8881	-14.89307
2.3275	-971.5784	-14.93616
2.3300	-977.2971	-1 .97933
2.3325	-983.0444	-15.02259
2.3350	-988.8202	-15.06594
2.3375	-994.6249	-15.10938

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	x_4	x_2
2.3400	-1000.458	-15.15290
2.3425	-1006.320	-15.19651
2.3450	-1012.212	-15.24021
2.3475	-1018.133	-15.28400
2.3500	-1024.083	-15.32787
2.3525	-1030.063	-15.37183
2.3550	-1036.072	-15.41588
2.3575	-1042.111	-15.46002
2.3600	-1048.179	-15.50425
2.3625	-1054.278	-15.54857
2.3650	-1060.407	-15.59297
2.3675	-1066.566	-15.63747
2.3700	-1072.755	-15.68205
2.3725	-1078.975	-15.72672
2.3750	-1085.225	-15.77148
2.3775	-1091.505	-15.81633
2.3800	-1097.817	-15.86127
2.3825	-1104.160	-15.90629
2.3850	-1110.533	-15.95141
2.3875	-1116.938	-15.99662
2.3900	-1123.374	-16.04191
2.3925	-1129.841	-16.08730
2.3950	-1136.340	-16.13277
2.3975	-1142.870	-16.17834
2.4000	-1149.433	-16.22400
2.4025	-1156.027	-16.26974
2.4050	-1162.653	-16.31558
2.4075	-1169.311	-16.36150
2.4100	-1176.002	-16.40752
2.4125	-1182.725	-16.45362
2.4150	-1189.480	-16.49982
2.4175	-1196.269	-16.54611
2.4200	-1203.090	-16.59248
2.4225	-1209.944	-16.63895
2.4250	-1216.831	-16.68551
2.4275	-1223.751	-16.73216
2.4300	-1230.704	-16.77890
2.4325	-1237.691	-16.82573
2.4350	-1244.711	-16.87266
2.4375	-1251.765	-16.91967
2.4400	-1258.853	-16.96678
2.4425	-1265.975	-17.01398
2.4450	-1273.131	-17.06127
2.4475	-1280.321	-17.10863
2.4500	-1287.546	-17.15612
2.4525	-1294.805	-17.20368
2.4550	-1302.098	-17.25134
2.4575	-1309.427	-17.29909
2.4600	-1316.790	-17.34693

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ	x_4	x_2
2.4625	-1324.188	-17.39486
2.4650	-1331.622	-17.44289
2.4675	-1339.090	-17.49101
2.4700	-1346.594	-17.53922
2.4725	-1354.134	-17.58752
2.4750	-1361.709	-17.63592
2.4775	-1369.321	-17.68441
2.4800	-1376.968	-17.73299
2.4825	-1384.651	-17.78166
2.4850	-1392.371	-17.83043
2.4875	-1400.127	-17.87929
2.4900	-1407.919	-17.92824
2.4925	-1415.748	-17.97729
2.4950	-1423.614	-18.02643
2.4975	-1431.517	-18.07567
2.5000	-1439.457	-18.12500
2.5025	-1447.434	-18.17442
2.5050	-1455.448	-18.22393
2.5075	-1463.500	-18.27354
2.5100	-1471.590	-18.32325
2.5125	-1479.717	-18.37304
2.5150	-1487.883	-18.42294
2.5175	-1496.086	-18.47292
2.5200	-1504.328	-18.52300
2.5225	-1512.608	-18.57318
2.5250	-1520.927	-18.62345
2.5275	-1529.284	-18.67381
2.5300	-1537.680	-18.72427
2.5325	-1546.115	-18.77483
2.5350	-1554.589	-18.82548
2.5375	-1563.102	-18.87622
2.5400	-1571.655	-18.92706
2.5425	-1580.247	-18.97799
2.5450	-1588.879	-19.02902
2.5475	-1597.550	-19.08015
2.5500	-1606.262	-19.13137
2.5525	-1615.014	-19.18269
2.5550	-1623.806	-19.23410
2.5575	-1632.639	-19.28561
2.5600	-1641.512	-19.33721
2.5625	-1650.425	-19.38891
2.5650	-1659.380	-19.44071
2.5675	-1668.376	-19.49260
2.5700	-1677.413	-19.54459
2.5725	-1686.491	-19 59667
2.5750	-1695.611	-19.64885
2.5775	-1704.772	-19.70113
2.5800	-1713.975	-19.75351
2.5825	-1723.220	-19.80598

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ	x_4	x_2
2.5850	-1732.507	-19.85855
2.5875	-1741.837	-19.91121
2.5900	-1751.209	-19.96397
2.5925	-1760.623	-20.01683
2.5950	-1770.080	-20.06979
2.5975	-1779.580	-20.12284
2.6000	-1789.123	-20.17600
2.6025	-1798.709	-20.22924
2.6050	-1808.339	-20.28259
2.6075	-1818.012	-20.33603
2.6100	-1827.729	-20.38958
2.6125	-1837.490	-20.44322
2.6150	-1847.294	-20.49695
2.6175	-1857.143	-20.55079
2.6200	-1867.036	-20.60472
2.6225	-1876.974	-20.65876
2.6250	-1886.956	-20.71289
2.6275	-1896.983	-20.76711
2.6300	-1907.055	-20.82144
2.6325	-1917.172	-20.87587
2.6350	-1927.334	-20.93039
2.6375	-1937.542	-20.98502
2.6400	-1947.795	-21.03974
2.6425	-1958.094	-21.09456
2.6450	-1968.439	-21.14948
2.6475	-1978.831	-21.20450
2.6500	-1989.268	-21.25962
2.6525	-1999.752	-21.31484
2.6550	-2010.283	-21.37016
2.6575	-2020.860	-21.42557
2.6600	-2031.484	-21.48109
2.6625	-2042.156	-21.53671
2.6650	-2052.874	-21.59242
2.6675	-2063.640	-21.64824
2.6700	-2074.454	-21.70416
2.6725	-2085.315	-21.76017
2.6750	-2096.225	-21.81629
2.6775	-2107.183	-21.87251
2.6800	-2118.188	-21.92883
2.6825	-2129.243	-21.98525
2.6850	-2140.346	22.04176
2.6875	-2151.498	-22.09838
2.6900	-2162.690	-22.15510
2.6925	-2173.948	-22.21193
2.6950	-2185.248	-22.26887
2.6975	-2196.596	-22.32587
2.7000	-2207.995	-22.38300
2.7025	-2219.443	-22.44022
2.7050	-2230.942	-22.49755

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3{,}1250$

ξ	x_4	x_2
2.7075	-2242.490	-22.55498
2.7100	-2254.089	-22.61251
2.7125	-2265.739	-22.67014
2.7150	-2277.439	-22.72787
2.7175	-2289.191	-22.78571
2.7200	-2300.993	-22.84364
2.7225	-2312.847	-22.90168
2.7250	-2324.752	-22.95982
2.7275	-2336.708	-23.01807
2.7300	-2348.717	-23.07641
2.7325	-2360.778	-23.13486
2.7350	-2372.890	-23.19341
2.7375	-2385.056	-23.25206
2.7400	-2397.273	-23.31082
2.7425	-2409.544	-23.36968
2.7450	-2421.867	-23.42864
2.7475	-2434.244	-23.48770
2.7500	-2446.673	-23.54687
2.7525	-2459.157	-23.60614
2.7550	-2471.694	-23.66551
2.7575	-2484.284	-23.72499
2.7600	-2496.929	-23.78457
2.7625	-2509.628	-23.84425
2.7650	-2522.381	-23.90404
2.7675	-2535.189	-23.96393
2.7700	-2548.052	-24.02393
2.7725	-2560.970	-24.08403
2.7750	-2573.943	-24.14423
2.7775	-2586.971	-24.20454
2.7800	-2600.055	-24.26495
2.7825	-2613.195	-24.32546
2.7850	-2626.390	-24.38608
2.7875	-2639.642	-24.44681
2.7900	-2652.950	-24.50763
2.7925	-2666.314	-24.56857
2.7950	-2679.735	-24.62960
2.7975	-2693.213	-24.69075
2.8000	-2706.748	-24.75200
2.8025	-2720.341	-24.81335
2.8050	-2733.990	-24.87481
2.8075	-2747.698	-24.93637
2.8100	-2761.463	-24.99804
2.8125	-2775.287	-25.05981
2.8150	-2789.169	-25.12169
2.8175	-2803.109	-25.18367
2.8200	-2817.108	-25.24576
2.8225	-2831.165	-25.30796
2.8250	-2845.282	-25.37026
2.8275	-2859.453	-25.43267

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	x_4	x_2
2.8300	-2873.693	-25.49518
2.8325	-2887.989	-25.55780
2.8350	-2902.344	-25.62053
2.8375	-2916.759	-25.68336
2.8400	-2931.234	-25.74630
2.8425	-2945.770	-25.80934
2.8450	-2960.366	-25.87250
2.8475	-2975.023	-25.93575
2.8500	-2989.742	-25.99912
2.8525	-3004.521	-26.06259
2.8550	-3019.363	-26.12617
2.8575	-3034.265	-26.18986
2.8600	-3049.230	-26.25365
2.8625	-3064.257	-26.31755
2.8650	-3079.346	-26.38156
2.8675	-3094.498	-26.44568
2.8700	-3109.712	-26.50990
2.8725	-3124.990	-26.57423
2.8750	-3140.330	-26.63867
2.8775	-3155.734	-26.70321
2.8800	-3171.202	-26.76787
2.8825	-3186.733	-26.83263
2.8850	-3202.328	-26.89750
2.8875	-3217.988	-26.96248
2.8900	-3233.712	-27.02756
2.8925	-3249.500	-27.09276
2.8950	-3265.354	-27.15806
2.8975	-3281.272	-27.22347
2.9000	-3297.256	-27.28900
2.9025	-3313.305	-27.35462
2.9050	-3329.420	-27.42036
2.9075	-3345.601	-27.48621
2.9100	-3361.843	-27.55217
2.9125	-3378.162	-27.61823
2.9150	-3394.541	-27.68441
2.9175	-3410.988	-27.75069
2.9200	-3427.502	-27.81708
2.9225	-3444.083	-27.88359
2.9250	-3460.732	-27.95070
2.9275	-3477.448	-28.0[illegible]692
2.9300	-3494.232	-28.08375
2.9325	-3511.084	-28.15069
2.9350	-3528.005	-28.21775
2.9375	-3544.994	-28.28491
2.9400	-3562.052	-28.35218
2.9425	-3579.179	-28.41956
2.9450	-3596.375	-28.48705
2.9475	-3613.641	-28.55466
2.9500	-3630.976	-28.62237

Table 3 (Continued)

(c) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	x_4	x_2
2.9525	-3648.381	-28.69019
2.9550	-3665.857	-28.75813
2.9575	-3683.402	-28.82617
2.9600	-3701.019	-28.89433
2.9625	-3718.706	-28.96260
2.9650	-3736.464	-29.03098
2.9675	-3754.294	-29.09947
2.9700	-3772.195	-29.16807
2.9725	-3790.168	-29.23678
2.9750	-3808.213	-29.30560
2.9775	-3826.330	-29.37454
2.9800	-3844.520	-29.44359
2.9825	-3862.782	-29.51275
2.9850	-3881.117	-29.58202
2.9875	-3899.525	-29.65140
2.9900	-3918.007	-29.72089
2.9925	-3936.562	-29.79050
2.9950	-3955.191	-29.86022
2.9975	-3973.895	-29.93005
3.0000	-3992.672	-30.00000
3.0025	-4011.524	-30.07005
3.0050	-4030.451	-30.14022
3.0075	-4049.453	-30.21050
3.0100	-4068.531	-30.28090
3.0125	-4087.683	-30.35140
3.0150	-4106.912	-30.42202
3.0175	-4126.216	-30.49276
3.0200	-4145.597	-30.56360
3.0225	-4165.055	-30.63456
3.0250	-4184.589	-30.70564
3.0275	-4204.200	-30.77682
3.0300	-4223.888	-30.84812
3.0325	-4243.654	-30.91954
3.0350	-4263.497	-30.99106
3.0375	-4283.419	-31.06270
3.0400	-4303.418	-31.13446
3.0425	-4323.496	-31.20633
3.0450	-4343.653	-31.27831
3.0475	-4363.889	-31.35041
3.0500	-4384.203	-31.42262
3.0525	-4404.598	
3.0550	-4425.072	-31.56739
3.0575	-4445.626	-31.63994
3.0600	-4466.260	-31.71261
3.0625	-4486.975	-31.78540
3.0650	-4507.770	-31.85829
3.0675	-4528.646	-31.93131
3.0700	-4549.604	-32.00444
3.0725	-4570.642	-32.07768

Table 3 (Continued)

(c) $-1.0200 \leq \xi \leq 3.1250$

ξ	x_4	x_2
3.0750	-4591.763	-32.15104
3.0775	-4612.966	-32.22452
3.0800	-4634.251	-32.29811
3.0825	-4655.618	-32.37181
3.0850	-4677.068	-32.44563
3.0875	-4698.601	-32.51957
3.0900	-4720.217	-32.59362
3.0925	-4741.917	-32.66779
3.0950	-4763.701	-32.74208
3.0975	-4785.568	-32.81648
3.1000	-4807.520	-32.89100
3.1025	-4829.557	-32.96563
3.1050	-4851.678	-33.04038
3.1075	-4873.884	-33.11524
3.1100	-4896.176	-33.19023
3.1125	-4918.553	-33.26533
3.1150	-4941.016	-33.34054
3.1175	-4963.566	-33.41587
3.1200	-4986.201	-33.49132
3.1225	-5008.924	-33.56689
3.1250	-5031.733	-33.64257

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
-.0150	1.427866	.229417
-.0200	1.411906	.226176
-.0250	1.396268	.223072
-.0300	1.380946	.220113
-.0350	1.366429	.217270
-.0400	1.351340	.214580
-.0450	1.337147	.212002
-.0500	1.322798	.209558
-.0550	1.308941	.207237
-.0600	1.295541	.205037
-.0650	1.282283	.202959
-.0700	1.269219	.200999
-.0750	1.256559	.199156
-.0800	1.244082	.197427
-.0850	1.231877	.195812
-.0900	1.219969	.194312
-.0950	1.208275	.192919
-.1000	1.196833	.191639
-.1050	1.185642	.190468
-.1100	1.174677	.189402
-.1150	1.163946	.188446
-.1200	1.153430	.187594
-.1250	1.143150	.186848
-.1300	1.133085	.186208
-.1350	1.123250	.185669
-.1400	1.113605	.185235
-.1450	1.104176	.184904
-.1500	1.094943	.184675
-.1550	1.085910	.184549
-.1600	1.077074	.184524
-.1650	1.068430	.184603
-.1700	1.059975	.184784
-.1750	1.051703	.185065
-.1800	1.043612	.185449
-.1850	1.035701	.185934
-.1900	1.027964	.186522
-.1950	1.020393	.187213
-.2000	1.012999	.188007
-.2050	1.005764	.188904
-.2100	.9986921	.189905
-.2150	.9917817	.191011
-.2200	.9850264	.192222
-.2250	.9784238	.193537
-.2300	.9719729	.194959
-.2350	.9656727	.196490
-.2400	.9595143	.198128
-.2450	.9535022	.199875
-.2500	.9476284	.201732
-.2550	.9418935	.203731

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
-.2600	.9362924	.205782
-.2650	.9308263	.207977
-.2700	.925490	.210286
-.2750	.9202836	.212710
-.2800	.9152021	.215253
-.2850	.9102451	.217914
-.2900	.9054108	.220697
-.2950	.9006962	.223600
-.3000	.8960994	.226628
-.3050	.8916187	.229782
-.3100	.8872521	.233061
-.3150	.8829964	.236471
-.3200	.8788522	.240011
-.3250	.8748155	.243684
-.3300	.8708853	.247490
-.3350	.8670599	.251435
-.3400	.8633371	.255519
-.3450	.8597161	.259744
-.3500	.8561943	.264113
-.3550	.8527710	.268627
-.3600	.8494435	.273291
-.3650	.8462113	.278105
-.3700	.8430717	.283073
-.3750	.8400246	.288196
-.3800	.8370677	.293478
-.3850	.8341991	.298923
-.3900	.8314185	.304531
-.3950	.8287241	.310307
-.4000	.8261145	.316253
-.4100	.8211437	.328670
-.4200	.8164271	.341804
-.4300	.8121639	.355685
-.4400	.8081355	.370339
-.4500	.8044026	.385794
-.4600	.8009560	.402084
-.4700	.7977882	.419237
-.4800	.7948910	.437287
-.4900	.7922568	.456269
-.5000	.7898782	.475218
-.5100	.7877482	.497170
-.5200	.7858603	.519165
-.5300	.7842076	.542243
-.5400	.7827846	.566445
-.5500	.7815849	.591812
-.5600	.7806027	.618391
-.5700	.7798327	.646230
-.5800	.7792658	.675373
-.5900	.7789085	.705871
-.6000	.7787445	.737775

Table 3 (Continued)

(d) $-1.0200 \leq \xi \leq 3.1250$

ξ	δ_4	y_5
-.6100	.7787730	.771138
-.6200	.7789893	.806016
-.6300	.7793896	.842466
-.6400	.7799692	.880543
-.6500	.7807246	.920311
-.6600	.7816518	.961832
-.6700	.7827474	1.005170
-.6800	.7840076	1.050392
-.6900	.7854278	1.097568
-.7000	.7870087	1.146763
-.7100	.7887437	1.198057
-.7200	.7906303	1.251523
-.7300	.7926661	1.307237
-.7400	.7948485	1.365283
-.7500	.7971746	1.425740
-.7600	.7996418	1.488695
-.7700	.8022477	1.554233
-.7800	.8049899	1.622447
-.7900	.8078663	1.693427
-.8000	.8108746	1.767271
-.8100	.8140125	1.844075
-.8200	.8172783	1.923942
-.8300	.8206698	2.006972
-.8400	.8241853	2.093276
-.8500	.8278228	2.182961
-.8600	.8315807	2.276142
-.8700	.8354572	2.372933
-.8800	.8394506	2.473451
-.8900	.8435596	2.577822
-.9000	.8477825	2.686170
-.9100	.8521178	2.798624
-.9200	.8565644	2.915314
-.9300	.8611205	3.036378
-.9400	.8657351	3.161954
-.9500	.8705569	3.292186
-.9600	.8754347	3.427221
-.9700	.8804171	3.567205
-.9800	.8855031	3.712296
-.9900	.8905917	3.862551
-1.0000	.8959817	4.018432
-1.0100	.9013722	4.179803
-1.0200	.9068623	4.346936

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
.0150	1.530795	.251942
.0175	1.540035	.254080
.0200	1.549307	.256243
.0225	1.558584	.258447
.0250	1.568049	.260708
.0275	1.577603	.263000
.0300	1.587230	.265335
.0325	1.596978	.267715
.0350	1.606836	.270149
.0375	1.616770	.272618
.0400	1.626814	.275126
.0425	1.636964	.277689
.0450	1.647215	.280298
.0475	1.657572	.282955
.0500	1.668031	.285654
.0525	1.678595	.288402
.0550	1.689266	.291200
.0575	1.700043	.294049
.0600	1.710935	.296943
.0625	1.721937	.299890
.0650	1.733048	.302890
.0675	1.744272	.305943
.0700	1.755610	.309045
.0725	1.767063	.312203
.0750	1.778632	.315412
.0775	1.790318	.318682
.0800	1.802122	.322001
.0825	1.814044	.325379
.0850	1.826088	.328816
.0875	1.838252	.332309
.0900	1.850540	.335860
.0925	1.862951	.339472
.0950	1.875488	.343148
.0975	1.888151	.346879
.1000	1.900940	.350676
.1025	1.913859	.354535
.1050	1.926907	.358457
.1075	1.940086	.362447
.1100	1.953399	.366503
.1125	1.966844	.370622
.1150	1.980425	.374811
.1175	1.994141	.379070
.1200	2.007996	.383399
.1225	2.021988	.387795
.1250	2.036121	.392267
.12[illegible]5	2.050396	.396810
.1300	2.064813	.401427
.1325	2.079375	.406121
.1350	2.094082	.410891

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
.1375	2.108935	.415738
.1400	2.123937	.420664
.1425	2.139089	.425668
.1450	2.154392	.430756
.1475	2.169848	.435923
.1500	2.185457	.441177
.1525	2.201222	.446514
.1550	2.217144	.451937
.1575	2.233224	.457446
.1600	2.249464	.463047
.1625	2.265865	.468734
.1650	2.282429	.474516
.1675	2.299158	.480388
.1700	2.316050	.486357
.1725	2.333114	.492421
.1750	2.350346	.498581
.1775	2.367748	.504841
.1800	2.385322	.511200
.1825	2.403070	.517661
.1850	2.420994	.524228
.1875	2.439094	.530898
.1900	2.457374	.537674
.1925	2.475834	.544557
.1950	2.494476	.551552
.1975	2.513302	.558658
.2000	2.532314	.565878
.2025	2.551513	.573213
.2050	2.570901	.580665
.2075	2.590480	.588236
.2100	2.610252	.595927
.2125	2.630219	.603740
.2150	2.650381	.611678
.2175	2.670740	.619745
.2200	2.691300	.627936
2225	2.712062	.636262
.2250	2.733027	.644717
.2275	2.754198	.653309
.2300	2.775576	.662037
.2325	2.797163	.670904
2350	2.818961	.679910
.2375	2.840973	.689061
.2400	2.863199	.698357
.2425	2.885643	.707801
.2450	2.908306	.717396
.2475	2.931189	.727143
.2500	2.954296	.737046
.2525	2.977628	.747105
.2550	3.001187	.757325
.2575	3.024975	.767706

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
.2600	3.048994	.778252
.2625	3.073247	.788969
.2650	3.097736	.799851
.2675	3.122462	.810910
.2700	3.147428	.822145
.2725	3.172636	.833557
.2750	3.198089	.845150
.2775	3.223787	.856929
.2800	3.249735	.868892
.2825	3.275933	.881049
.2850	3.302385	.893398
.2875	3.329092	.905942
.2900	3.356057	.918685
.2925	3.383281	.931633
.2950	3.410769	.944785
.2975	3.438521	.958145
.3000	3.466540	.971719
.3025	3.494829	.985508
.3050	3.523390	.999515
.3075	3.552225	1.013748
.3100	3.581337	1.028204
.3125	3.610728	1.042891
.3150	3.640402	1.057809
.3175	3.670359	1.072968
.3200	3.700604	1.088364
.3225	3.731137	1.104007
.3250	3.761963	1.119897
.3275	3.793083	1.136042
.3300	3.824501	1.152441
.3325	3.856210	1.169101
.3350	3.888238	1.186026
.3375	3.920563	1.203219
.3400	3.953195	1.220685
.3425	3.986133	1.238429
.3450	4.019395	1.256453
.3475	4.052967	1.274766
.3500	4.086858	1.293367
.3525	4.121070	1.312264
.3550	4.155608	1.331452
.3575	4.190471	1.350962
.3600	4.225666	1.370774
.3625	4.261192	1.390899
.3650	4.297055	1.411343
.3675	4.333257	1.432112
.3700	4.369800	1.453210
.3725	4.406688	1.474643
.3750	4.443924	1.496417
.3775	4.481510	1.518535
.3800	4.519450	1.54100[illegible]

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
.3825	4,557746	1,563826
.3850	4,596402	1,587011
.3875	4,635421	1,610566
.3900	4,674807	1,634492
.3925	4,714561	1,658795
.3950	4,754687	1,683485
.3975	4,795189	1,708567
.4000	4,836070	1,734043
.4025	4,877333	1,759925
.4050	4,918981	1,786214
.4075	4,961017	1,812920
.4100	5,003445	1,840046
.4125	5,046268	1,867603
.4150	5,089490	1,895597
.4175	5,133113	1,924030
.4200	5,177142	1,952914
.4225	5,221579	1,982253
.4250	5,266428	2,012057
.4275	5,311693	2,042330
.4300	5,357377	2,073080
.4325	5,403484	2,104317
.4350	5,450016	2,136044
.4375	5,496979	2,168272
.4400	5,544374	2,201008
.4425	5,592207	2,234261
.4450	5,640480	2,268035
.4475	5,689197	2,302343
.4500	5,738363	2,337190
.4525	5,787979	2,372586
.4550	5,838052	2,408538
.4575	5,888583	2,445055
.4600	5,939578	2,482143
.4625	5,991039	2,519818
.4650	6,042971	2,558083
.4675	6,095377	2,596949
.4700	6,148262	2,636423
.4725	6,201629	2,676517
.4750	6,255462	2,717240
.4775	6,309326	2,758602
.4800	6,364664	2,800611
.4825	6,420000	2,843277
.4850	6,475839	2,886610
.4875	6,532184	2,930623
.4900	6,589041	2,975323
.4925	6,646411	3,020721
.4950	6,704301	3,066830
.4975	6,762713	3,113656
.5000	6,821654	3,161216
.5025	6,881125	3,209515

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
.5050	6.941133	3.258568
.5075	7.001681	3.308385
.5100	7.062774	3.358980
.5125	7.124415	3.410360
.5150	7.186610	3.462541
.5175	7.249362	3.515531
.5200	7.312677	3.569348
.5225	7.376559	3.623998
.5250	7.441012	3.679498
.5275	7.506040	3.735858
.5300	7.571649	3.793093
.5325	7.637843	3.851213
.5350	7.704627	3.910236
.5375	7.772004	3.970172
.5400	7.839981	4.031033
.5425	7.908561	4.092837
.5450	7.977751	4.155596
.5475	8.047552	4.219325
.5500	8.117973	4.284036
.5525	8.189015	4.349744
.5550	8.260686	4.416468
.5575	8.332990	4.484217
.5600	8.405931	4.553010
.5625	8.479514	4.622862
.5650	8.553746	4.693785
.5675	8.628629	4.765800
.5700	8.704170	4.838922
.5725	8.780374	4.913163
.5750	8.857246	4.988545
.5775	8.934791	5.065080
.5800	9.013014	5.142789
.5825	9.091921	5.221686
.5850	9.171516	5.301789
.5875	9.251805	5.383117
.5900	9.332794	5.465685
.5925	9.414487	5.549515
.5950	9.496890	5.634621
.5975	9.580008	5.721026
.6000	9.663848	5.808746
.6025	9.748413	5.897800
.6050	9.833711	5.988209
.6075	9.919746	6.079989
.6100	10.00652	6.173165
.6125	10.09405	6.267751
.6150	10.18233	6.363774
.6175	10.27137	6.461249
.6200	10.36117	6.560201
.6225	10.45175	6.660649
.6250	10.54311	6.762612

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
.6275	10.63524	6.866118
.6300	10.72617	6.971182
.6325	10.82189	7.077634
.6350	10.91641	7.186090
.6375	11.01174	7.295975
.6400	11.10788	7.407511
.6425	11.20484	7.520725
.6450	11.30263	7.635637
.6475	11.40124	7.752274
.6500	11.50070	7.870659
.6525	11.60099	7.990815
.6550	11.70213	8.112772
.6575	11.80413	8.236549
.6600	11.90700	8.362177
.6625	12.01072	8.489679
.6650	12.11533	8.619081
.6675	12.22081	8.750412
.6700	12.32719	8.883699
.6725	12.43445	9.018967
.6750	12.54262	9.156245
.6775	12.65169	9.295561
.6800	12.76168	9.435943
.6825	12.87258	9.580420
.6850	12.98441	9.726023
.6875	13.09718	9.873779
6900	13.21088	10.02371
.6925	13.32553	10.17587
.6950	13.44114	10.33027
.6975	13.55770	10.48694
.7000	13.67524	10.64592
.7025	13.79374	10.80724
.7050	13.91323	10.97093
.7075	14.03370	11.13702
.7100	14.15517	11.30555
.7125	14.27764	11.47656
.7150	14.40113	11.65006
.7175	14.52562	11.82610
.7200	14.65114	12.00472
.7225	14.77769	12.18594
.7250	14.90528	12.36981
.7275	15.03392	12.55636
.7300	15.16360	12.74562
.7325	15.29435	12.93763
.73 0	15.42616	13.13244
.7375	15.55905	13.33007
.7400	15.69302	13.53057
.7425	15.82808	13.73397
.7450	15.96424	13.94035
.7475	16.10150	14.14965

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
.7500	16.23987	14.36201
.7525	16.37936	14.57743
.7550	16.51999	14.79595
.7575	16.66174	15.01762
.7600	16.80465	15.24248
.7625	16.94670	15.47057
.7650	17.09391	15.70194
.7675	17.24029	15.93662
.7700	17.38784	16.17467
.7725	17.53658	16.41613
.7750	17.68651	16.66103
.7775	17.83763	16.90944
.7800	17.98997	17.16139
.7825	18.14352	17.41693
.7850	18.29829	17.67611
.7875	18.45430	17.93897
.7900	18.61155	18.20557
.7925	18.77004	18.47596
.7950	18.92979	18.75018
.7975	19.09081	19.02828
.8000	19.25310	19.31032
.8025	19.41668	19.59635
.8050	19.58154	19.88641
.8075	19.74771	20.18056
.8100	19.91518	20.47887
.8125	20.08397	20.78136
.8150	20.25409	21.08811
.8175	20.42554	21.39917
.8200	20.59834	21.71460
.8225	20.77248	22.03444
.8250	20.94798	22.35476
.8275	21.12487	22.68762
.8300	21.30313	23.02106
.8325	21.48277	23.35917
.8350	21.66382	23.70198
.8375	21.84627	24.04957
.8400	22.03013	24.40129
.8425	22.21542	24.75930
.8450	22.40215	25.12158
.8475	22.59031	25.48888
.8500	22.77934	25.85126
.8525	22.97102	26.23879
.8550	23.16357	26.62154
.8575	23.35761	27.00957
.8600	23.55314	27.40295
.8625	23.75016	27.80174
.8650	23.94870	28.20602
.8675	24.14876	28.61585
.8700	24.35034	29.03131

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_s
.8725	24 .55347	29 .45247
.8750	24 .75814	29 .87938
.8775	24 .96438	30 .31214
.8800	25 .17218	30 .75081
.8825	25 .38156	31 .19547
.8850	25 .59253	31 .64618
.8875	25 .80510	32 .10303
.8900	26 .01928	32 .56610
.8925	26 .23507	33 .03545
.8950	26 .45250	33 .51117
.8975	26 .67156	33 .99334
.9000	26 .89228	34 .48204
.9025	27 .11466	34 .97734
.9050	27 .33870	35 .47934
.9075	27 .56443	35 .98810
.9100	27 .79185	36 .50372
.9125	28 .02097	37 .02628
.9150	28 .25180	37 .55587
.9175	28 .48436	38 .09256
.9200	28 .71865	38 .63646
.9225	28 .95469	39 .18764
.9250	29 .19248	39 .74620
.9275	29 .43204	40 .31222
.9300	29 .67337	40 .88579
.9325	29 .91649	41 .46702
.9350	30 .16142	42 .05599
.9375	30 .40815	42 .65279
.9400	30 .65670	43 .25752
.9425	30 .90709	43 .87028
.9450	31 .15932	44 .49116
.9475	31 .41340	45 .12026
.9500	31 .66936	45 .75768
.9525	31 .92718	46 .40352
.9550	32 .13690	47 .05788
.9575	32 .44852	47 .72087
.9600	32 .71205	48 .39258
.9625	32 .97750	49 .07313
.9650	33 .24489	49 .76261
.9675	33 .51422	50 .46113
.9700	33 .78551	51 .16880
.9725	34 .05878	51 .88574
.9750	34 .33402	52 .61204
.9775	34 .61126	53 .34783
.9800	34 .89050	54 .09320
.9825	35 .17176	54 .84829
.9850	35 .45505	55 .61319
.9875	35 .74038	56 .38804
.9900	36 .02777	57 .17293
.9925	36 .31722	57 .96800

Table 3 (Continued)

(d) $-1.0200 \leq \xi \leq 3.1250$

ξ	δ_4	y_5
.9950	36.60875	58.77336
.9975	36.90237	59.58914
1.0000	37.19809	60.41545
1.0025	37.49593	61.25241
1.0050	37.79589	62.10016
1.0075	38.09799	62.95882
1.0100	39.00389	63.82851
1.0125	38.70867	64.70937
1.0150	39.01727	65.60152
1.0175	39.32806	66.50509
1.0200	39.64105	67.42022
1.0225	39.95626	68.34704
1.0250	40.27370	69.28569
1.0275	40.59338	70.23629
1.0300	40.91531	71.19900
1.0325	41.23951	72.17394
1.0350	41.56600	73.16127
1.0375	41.89477	74.16111
1.0400	42.22585	75.17362
1.0425	42.55926	76.19894
1.0450	42.89499	77.23721
1.0475	43.23308	78.28859
1.0500	43.57352	79.35322
1.0525	43.91634	80.43125
1.0550	44.26154	81.52284
1.0575	44.60915	82.62813
1.0600	44.95917	83.74729
1.0625	45.31162	84.88047
1.0650	45.66651	86.02784
1.0675	46.02385	87.18953
1.0700	46.38367	88.36574
1.0725	46.74597	89.55660
1.0750	47.11076	90.76229
1.0775	47.47807	91.98298
1.0800	47.84790	93.21883
1.0825	48.22027	94.47001
1.0850	48.59520	95.73670
1.0875	48.97270	97.01906
1.0900	49.35277	98.31727
1.0925	49.73545	99.63150
1.0950	50.12073	100.9619
1.0975	50.50864	102.3087
1.1000	50.89920	103.6721
1.1025	51.29240	105.0523
1.1050	51.68828	106.4493
1.1075	52.08683	107.8635
1.1100	52.48809	109.2950
1.1125	52.89206	110.7441
1.1150	53.29877	112.2108

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
1.1175	53.70821	113.6953
1.1200	54.12041	115.1980
1.1225	54.53539	116.7189
1.1250	54.95316	118.2584
1.1275	55.37372	119.8165
1.1300	55.79711	121.3934
1.1325	56.22334	122.9895
1.1350	56.65241	124.6049
1.1375	57.08435	126.2398
1.1400	57.51917	127.8944
1.1425	57.95688	129.5689
1.1450	58.39751	131.2635
1.1475	58.84106	132.9786
1.1500	59.28756	134.7142
1.1525	59.73702	136.4706
1.1550	60.18945	138.2480
1.1575	60.64487	140.0467
1.1600	61.10331	141.8669
1.1625	61.56476	143.7087
1.1650	62.02925	145.5725
1.1675	62.49679	147.4585
1.1700	62.96741	149.3669
1.1725	63.44112	151.2980
1.1750	63.91793	153.2519
1.1775	64.39786	155.2289
1.1800	64.88092	157.2294
1.1625	65.35714	159.2534
1.1850	65.85653	161.3014
1.1875	66.34911	163.3734
1.1900	66.84489	165.4699
1.1925	67.34388	167.5910
1.1950	67 84612	169.7369
1.1975	68.35161	171.9080
1.2000	68.86037	174.1045
1.2025	69.37241	176.3268
1.2050	69.88777	178.5750
1.2075	70.40644	180.8494
1.2100	70.92845	183.1502
1.2125	71.45382	185.4779
1.2150	71.98256	187.8326
1.2175	72.51469	190.2146
1.2200	73.05024	192.6243
1.2225	73.58920	195.0618
1.2250	74.13162	197.5276
1.2275	74.67749	200.0218
1.2300	75.22684	202.5448
1.2325	75.77968	205.0968
1.2350	76.33605	207.6782
1.2375	76.89594	210.2893

Table 3 (Continued)

(d) $-1.0200 \leq \xi \leq 3.1250$

ξ	δ_4	y_5
1.2400	77.45939	212.9303
1.2425	78.02640	215.6016
1.2450	78.59700	218.3035
1.2475	79.17121	221.0363
1.2500	79.74904	223.8004
1.2525	80.33050	226.5959
1.2550	80.91563	229.4233
1.2575	81.50444	232.2828
1.2600	82.09694	235.1749
1.2625	82.69316	238.0998
1.2650	83.29311	241.0578
1.2675	83.89682	244.0494
1.2700	84.50429	247.0747
1.2725	85.11556	250.1343
1.2750	85.73063	253.2283
1.2775	86.34953	256.3572
1.2800	86.97228	259.5214
1.2825	87.59890	262.7210
1.2850	88.22940	265.9566
1.2875	88.86380	269.2285
1.2900	89.50213	272.5370
1.2925	90.14440	275.8825
1.2950	90.79064	279.2654
1.2975	91.44085	282.6860
1.3000	92.09507	286.1448
1.3025	92.75330	289.6420
1.3050	93.41558	293.1781
1.3075	94.08192	296.7535
1.3100	94.75234	300.3685
1.3125	95.42686	304.0235
1.3150	96.10550	307.7190
1.3175	96.78828	311.4552
1.3200	97.47522	315.2327
1.3225	98.16634	319.0519
1.3250	98.86166	322.9130
1.3275	99.56120	326.8166
1.3300	100.2649	330.7631
1.3325	100.9730	334.7529
1.3350	101.6853	338.7863
1.3375	102.4019	342.8639
1.3400	103.1229	346.9560
1.3425	103.8487	351.1531
1.3450	104.5779	355.3656
1.3475	105.3119	359.6239
1.3500	106.0504	363.9286
1.3525	106.7933	368.2800
1.3550	107.5406	372.6786
1.3575	108.2924	377.1246
1.3600	109.0487	381.619[illegible]

Table 3 (Continued)

(d) $-1.0200 \leq \xi \leq 3.1250$

ξ	δ_4	y_5
1.3625	109.8095	386.1621
1.3650	110.5748	390.7540
1.3675	111.3447	395.3954
1.3700	112.1192	400.0868
1.3725	112.8983	404.8287
1.3750	113.6820	409.6214
1.3775	114.4703	414.4656
1.3800	115.2633	419.3617
1.3825	116.0610	424.3102
1.3850	116.8634	429.3115
1.3875	117.6705	434.3663
1.3900	118.4824	439.4749
1.3925	119.2990	444.6379
1.3950	120.1205	449.6559
1.3975	120.9467	455.1292
1.4000	121.7778	460.4585
1.4025	122.6138	465.8443
1.4050	123.4547	471.2871
1.4075	124.3004	476.7874
1.4100	125.1511	482.3458
1.4125	126.0067	487.9628
1.4150	126.8674	493.6390
1.4175	127.7330	499.3749
1.4200	128.6036	505.1710
1.4225	129.4793	511.0280
1.4250	130.3600	516.9464
1.4275	131.2459	522.9267
1.4300	132.1368	528.9695
1.4325	133.0329	535.0755
1.4350	133.9342	541.2451
1.4375	134.8406	547.4790
1.4400	135.7523	553.7778
1.4425	136.6692	560.1421
1.4450	137.5913	566.5724
1.4475	138.5187	573.0694
1.4500	139.4514	579.6336
1.4525	140.3895	586.2658
1.4550	141.3329	592.9664
1.4575	142.2816	599.7362
1.4600	143.2358	606.5758
1.4625	144.1954	613.4839
1.4650	145.1604	620.4668
1.4675	146.1310	627.5195
1.4700	147.1070	634.6445
1.4725	148.0885	641.8425
1.4750	149.0756	649.1141
1.4775	150.0662	656.4601
1.4800	151.0664	663.8810
1.4825	152.0703	671.3776

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
1.4850	153.0798	678.9505
1.4875	154.0950	686.6005
1.4900	155.1158	694.3281
1.4925	156.1424	702.1342
1.4950	157.1748	710.0194
1.4975	158.2129	717.9843
1.5000	159.2568	726.0298
1.5025	160.3065	734.1565
1.5050	161.3620	742.3652
1.5075	162.4235	750.6565
1.5100	163.4908	759.0314
1.5125	164.5640	767.4903
1.5150	165.6433	776.0342
1.5175	166.7284	784.6636
1.5200	167.8196	793.3796
1.5225	168.9168	802.1826
1.5250	170.0201	811.0737
1.5275	171.1294	820.0534
1.5300	172.2449	829.1227
1.5325	173.3664	838.2821
1.5350	174.4942	847.5327
1.5375	175.6281	856.8751
1.5400	176.7682	866.3103
1.5425	177.9146	875.8388
1.5450	179.0672	885.4617
1.5475	180.2261	895.1796
1.5500	181.3914	904.9935
1.5525	182.5629	914.9041
1.5550	183.7409	924.9124
1.5575	184.9253	935.0191
1.5600	186.1161	945.2251
1.5625	187.3133	955.5313
1.5650	188.5170	965.9385
1.5675	189.7272	976.4475
1.5700	190.9440	987.0594
1.5725	192.1673	997.7748
1.5750	193.3973	1008.594
1.5775	194.6338	1019.520
1.5800	195.8770	1030.552
1.5825	197.1269	1041.691
1.5850	198.3834	1052.538
1.5875	199.6467	1064.294
1.5900	200.9168	1075.760
1.5925	202.1936	1087.378
1.5950	203.4773	1099.027
1.5975	204.7678	1110.829
1.6000	206.0652	1122.745
1.6025	207.3695	1134.775
1.6050	208.6807	1146.921

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
1.6075	209.9988	1159.184
1.6100	211.3240	1171.565
1.6125	212.6562	1184.064
1.6150	213.9954	1196.683
1.6175	215.3417	1209.423
1.6200	216.6951	1222.284
1.6225	218.0557	1235.268
1.6250	219.4234	1248.376
1.6275	220.7982	1261.609
1.6300	222.1804	1274.967
1.6325	223.5697	1288.452
1.6350	224.9664	1302.066
1.6375	226.3703	1315.808
1.6400	227.7816	1329.680
1.6425	229.2003	1343.683
1.6450	230.6264	1357.819
1.6475	232.0599	1372.088
1.6500	233.5008	1386.491
1.6525	234.9493	1401.030
1.6550	236.4052	1415.705
1.6575	237.8688	1430.519
1.6600	239.3399	1445.471
1.6625	240.8186	1460.563
1.6650	242.3049	1475.796
1.6675	243.7990	1491.172
1.6700	245.3007	1506.691
1.6725	246.8102	1522.355
1.6750	248.3274	1538.165
1.6775	249.8525	1554.122
1.6800	251.3854	1570.227
1.6825	252.9261	1586.481
1.6850	254.4747	1602.887
1.6875	256.0313	1619.444
1.6900	257.5958	1636.154
1.6925	259.1683	1653.019
1.6950	260.7488	1670.039
1.6975	262.3373	1687.216
1.7000	263.9340	1704.551
1.7025	265.5387	1722.046
1.7050	267.1516	1739.701
1.7075	268.7727	1757.518
1.7100	270.4020	1775.499
1.7125	272.0395	1793.644
1.7150	273.6853	1811.955
1.7175	275.3394	830.434
1.7200	277.0019	1849.081
1.7225	278.6727	1867.597
1.7250	280.3519	1886.886
1.7275	282.0396	1906.046

Table 3 (Continued)

(d) - $1.0200 \leq \xi \leq 3.1250$

ξ	θ_s	y_s
1.7300	283.7357	1925.381
1.7325	285.4403	1944.891
1.7350	287.1535	1964.578
1.7375	288.8753	1984.443
1.7400	290 6056	2004.488
1.7425	292 3446	2024.713
1.7450	294 0923	2045.121
1.7475	295.8486	2065.713
1.7500	297.6137	2086.491
1.7525	299.3876	2107.455
1.7550	301.1703	2128.607
1.7575	302.9618	2149.949
1.7600	304.7622	2171.482
1.7625	306.5715	2193.208
1.7650	308.3897	2215.128
1.7675	310.2169	2237.244
1.7700	312.0531	2259.557
1.7725	313.8984	2282.069
1.7750	315.7527	2304.782
1.7775	317.6162	2327.696
1.7800	319.4888	2350.813
1.7825	321.3705	2374.136
1.7850	323.2615	2397.665
1.7875	325.1618	2421.403
1.7900	327.0713	2445.350
1.7925	328.9902	2469.509
1.7950	330.9184	2493.880
1.7975	332.8560	2518.467
1.8000	334.8031	2543.270
1.8025	336.7595	2568.291
1.8050	338.7256	2593.532
1.8075	340.7011	2618.994
1.8100	342.6862	2644.679
1.8125	344.6809	2670.589
1.8150	346.6853	2696.725
1.8175	348.6993	2723.090
1.8200	350.7230	2749.684
1.8225	352.7565	2776.510
1.8250	354.7998	2803.570
1.8275	356.8529	2830.866
1.8300	358.9159	2858.358
1.8325	360.9888	2886.169
1.8350	363.0716	2914.180
1.8375	365.1643	2942.434
1.8400	367.2671	2970.932
1.8425	369.3799	2999.677
1.8450	371.5028	3028.669
1.8475	373.6358	3057.911
1.8500	375.7790	3087.405

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
1.8525	377.9324	3117.152
1.8550	380.0960	3147.156
1.8575	382.2698	3177.416
1.8600	384.4540	3207.936
1.8625	386.6485	3238.717
1.8650	388.8534	3269.761
1.8675	391.0687	3301.071
1.8700	393.2945	3332.647
1.8725	395.5307	3364.493
1.8750	397.7775	3396.610
1.8775	400.0349	3429.000
1.8800	402.3029	3461.666
1.8825	404.5815	3494.608
1.8850	406.8708	3527.830
1.8875	409.1708	3561.333
1.8900	411.4816	3595.120
1.8925	413.8032	3629.192
1.8950	416.1357	3663.551
1.8975	418.4790	3698.201
1.9000	420.8332	3733.142
1.9025	423.1984	3768.377
1.9050	425.5746	3803.908
1.9075	427.9618	3839.738
1.9100	430.3601	3875.868
1.9125	432.7696	3912.300
1.9150	435.1901	3949.038
1.9175	437.6219	3986.083
1.9200	440.0649	4023.437
1.9225	442.5192	4061.102
1.9250	444.9848	4099.082
1.9275	447.4618	4137.377
1.9300	449.9501	4175.991
1.9325	452.4499	4214.926
1.9350	454.9612	4254.184
1.9375	457.4840	4293.767
1.9400	460.0183	4333.677
1.9425	462.5643	4373.918
1.9450	465.1219	4414.491
1.9475	467.6911	4455.399
1.9500	470.2721	4496.645
1.9525	472.8649	4538.230
1.9550	475.4694	4580.157
1.9575	478.0858	4622.428
1.9600	480.7141	4665.047
1.9625	483.3543	4708.014
1.9650	486.0065	4751.334
1.9675	488.6707	4795.009
1.9700	491.3469	4839.040
1.9725	494.0353	4883.431

Table 3 (Continued)

(d) $-1.0200 \leq \xi \leq 3.1250$

ξ	δ_4	y_5
1.9750	496.7357	4928.184
1.9775	[illegible]	[illegible]
1.9800	502.1733	5018.787
1.9825	504.9104	5064.641
1.9850	507.6599	5110.868
1.9875	510.4217	5157.470
1.9900	513.1959	5204.450
1.9925	515.9825	5251.810
1.9950	518.7816	5299.554
1.9975	521.5932	5347.682
2.0000	524.4174	5396.200
2.0025	527.2542	5445.108
2.0050	530.1037	5494.411
2.0075	532.9658	5544.110
2.0100	535.8407	5594.209
2.0125	538.7283	5644.709
2.0150	541.6288	5695.615
2.0175	544.5421	5746.929
2.0200	547.4684	5798.653
2.0225	550.4076	5850.791
2.0250	553.3598	5903.345
2.0275	556.3250	5956.319
2.0300	559.3033	6009.715
2.0325	562.2948	6063.536
2.0350	565.2994	6117.785
2.0375	568.3173	6172.465
2.0400	571.3484	6227.579
2.0425	574.3928	6283.130
2.0450	577.4506	6339.121
2.0475	580.5218	6395.555
2.0500	583.6064	6452.435
2.0525	586.7045	6509.764
2.0550	589.8162	6567.546
2.0575	592.9414	6625.782
2.0600	596.0803	6684.475
2.0625	599.2328	6743.634
2.0650	602.3990	6803.256
2.0675	605.5790	6863.345
2.0700	608.7728	6923.905
2.0725	611.9805	6984.939
2.0750	615.2020	7046.452
2.0775	618.4375	7108.444
2.0800	621.6870	7170.921
2.0825	624.9506	7233.885
2.0850	628.2282	7297.339
2.0875	631.5199	7361.288
2.0900	634.8259	7425.733
2.0925	638.1460	7490.679
2.0950	641.4804	7556.129

Table 3 (Continued)

(d) $-1.0200 \leq \xi \leq 3.1250$

ξ	δ_4	y_5
2.0975	644.8292	7622.087
2.1000	648.1923	7688.555
2.1025	651.5698	7755.537
2.1050	654.9618	7823.037
2.1075	658.3683	7891.058
2.1100	661.7893	7959.603
2.1125	665.2249	8028.676
2.1150	668.6752	8098.282
2.1175	672.1402	8168.422
2.1200	675.6200	8239.101
2.1225	679.1145	8310.322
2.1250	682.6239	8382.089
2.1275	686.1481	8454.406
2.1300	689.6873	8527.276
2.1325	693.2415	8600.703
2.1350	696.8107	8674.690
2.1375	700.3950	8749.241
2.1400	703.9945	8824.361
2.1425	707.6091	8900.052
2.1450	711.2389	8976.319
2.1475	714.8841	9053.165
2.1500	718.5445	9130.594
2.1525	722.2203	9208.610
2.1550	725.9116	9287.217
2.1575	729.6183	9366.418
2.1600	733.3406	9446.219
2.1625	737.0784	9526.621
2.1650	740.8319	9607.630
2.1675	744.6010	9689.249
2.1700	748.3859	9771.483
2.1725	752.1865	9854.335
2.1750	756.0030	9937.810
2.1775	759.8354	10021.91
2.1800	763.6836	10106.64
2.1825	767.5479	10192.00
2.1850	771.4282	10278.01
2.1875	775.3245	10364.66
2.1900	779.2370	10451.95
2.1925	783.1656	10539.90
2.1950	787.1105	10628.50
2.1975	791.0717	10717.75
2.2000	795.0492	10807.59
2.2025	799.0431	10898.28
2.2050	803.0534	10989.54
2.2075	807.0803	11081.49
2.2100	811.1236	11174.11
2.2125	815.1836	11267.42
2.2150	819.2602	11361.42
2.2175	823.3534	11456.11

Table 3 (Continued)

(d) $-1.0200 \leq \xi \leq 3.1250$

ξ	δ_6	y_8
2.2200	827.4635	11551.50
2.2225	831.5903	11647.60
2.2250	835.7340	11744.40
2.2275	839.8946	11841.92
2.2300	844.0722	11940.15
2.2325	848.2667	12039.10
2.2350	852.4784	12138.78
2.2375	856.7071	12239.19
2.2400	860.9530	12340.34
2.2425	865.2162	12442.22
2.2450	869.4966	12544.85
2.2475	873.7943	12648.23
2.2500	878.1094	12752.37
2.2525	882.4420	12857.26
2.2550	886.7920	12962.91
2.2575	891.1596	13069.24
2.2600	895.5448	13176.53
2.2625	899.9477	13284.51
2.2650	904.3682	13393.26
2.2675	908.8065	13502.81
2.2700	913.2627	13613.15
2.2725	917.7366	13724.28
2.2750	922.2286	13836.22
2.2775	926.7384	13948.96
2.2800	931.2664	14062.52
2.2825	935.8124	14176.90
2.2850	940.3765	14292.10
2.2875	944.9589	14408.12
2.2900	949.5595	14524 99
2.2925	954.1784	14642.68
2.2950	958.8157	14761.23
2.2975	963.4714	14880.62
2.3000	968.1456	15000.86
2.3025	972.8383	15121.97
2.3050	977.5496	15243.93
2 3075	982.2795	15366.77
2.3100	987.0281	15490.49
2.3125	991.7955	15615.08
2.3150	996.5817	15740.56
2.3175	1001.386	15866.93
2.3200	1006.210	15994.20
2.3225	1011.053	16122.37
2.3250	1015.915	16251.45
2.3275	1020.796	16381.45
2.3300	1025.697	16512.36
2.3325	1030.616	16644.20
2.3350	1035.555	16776.97
2.3375	1040.513	16910.67
2.3400	1045.490	17045.32

Table 3 (Continued)

(d) $-1.0200 \leq \xi \leq 3.1250$

ξ	δ_4	y_s
2.3425	1050.487	17180.91
2.3450	1055.504	17317.46
2.3475	1060.540	17454.96
2.3500	1065.595	17593.43
2.3525	1070.670	17732.88
2.3550	1075.765	17873.29
2.3575	1080.880	18014.70
2.3600	1086.015	18157.09
2.3625	1091.169	18300.47
2.3650	1096.344	18344.85
2.3675	1101.538	18590.25
2.3700	1106.753	18736.65
2.3725	1111.987	18884.07
2.3750	1117.242	19032.52
2.3775	1122.517	19182.00
2.3800	1127.813	19332.51
2.3825	1133.129	19484.07
2.3850	1138.465	19636.68
2.3875	1143.822	19790.35
2.3900	1149.199	19945.07
2.3925	1154.597	20100.87
2.3950	1160.016	20257.74
2.3975	1165.455	20415.69
2.4000	1170.915	20574.73
2.4025	1176.396	20734.86
2.4050	1181.898	20896.10
2.4075	1187.421	21058.44
2.4100	1192.965	21221.90
2.4125	1198.530	21386.47
2.4150	1204.116	21552.18
2.4175	1209.724	21719.01
2.4200	1215 352	21886.99
2.4225	1221.002	22056.11
2.4250	1226.674	22226.39
2.4275	1238.081	22397.83
2.4300	1238.081	22570.44
2.4325	1243.817	22744.22
2.4350	1249.575	22915.18
2.4375	1255.354	23095.33
2.4400	1261.156	23272.68
2.4425	1266.979	23451.2[illegible]
2.4450	1272.824	23630.99
2.4475	1278.691	23811.96
2.4500	1284.579	23994.16
2.4525	1290.490	24177.58
2.4550	1296.424	24362.25
2.4575	1302.379	24548.16
2.4600	1308.357	24735.32
2.4625	1314.357	24923.75

Table 3 (Continued)

(d) $-1.0200 \leq \xi \leq 3.1250$

ξ	δ_4	y_3
2.4650	1320.379	25113.44
2.4675	1326.424	25304.40
2.4700	1332.491	25496.64
2.4725	1338.581	25690.18
2.4750	1344.694	25885.01
2.4775	1350.829	26081.14
2.4800	1356.988	26278.59
2.4825	1363.169	26477.35
2.4850	1369.373	26677.44
2.4875	1375.599	26878.87
2.4900	1381.849	27081.63
2.4925	1388.122	27285.75
2.4950	1394.419	27491.22
2.4975	1400.738	27698.06
2.5000	1407.081	27906.27
2.5025	1413.447	28115.87
2.5050	1419.837	28326.85
2.5075	1426.250	28539.23
2.5100	1432.687	28753.01
2.5125	1439.147	28968.20
2.5150	1445.631	29184.82
2.5175	1452.139	29402.87
2.5200	1458.670	29622.35
2.5225	1465.226	29843.27
2.5250	1471.805	30065.65
2.5275	1478.409	30289.50
2.5300	1485.036	30514.81
2.5325	1491.688	30741.60
2.5350	1498.364	30969.87
2.5375	1505.064	31199.64
2.5400	1511.789	31430.92
2.5425	1518.538	31663.70
2.5450	1525.311	31898.01
2.5475	1532.109	32133.85
2.5500	1538.932	32371.22
2.5525	1545.779	32610.14
2.5550	1552.652	32850.61
2.5575	1559.549	33092.65
2.5600	1566.470	33336.26
2.5625	1573.417	33581.45
2.5650	1580.389	33828.23
2.5675	1587.386	34076.61
2.5700	1594.408	34326.60
2.5725	1601.456	34578.20
2.5750	1608.529	34831.43
2.5775	1615.627	35086.29
2.5800	1622.750	35342.80
2.5825	1629.899	35600.96
2.5850	1637.074	35860.79

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
2.5875	1644.274	36122.28
2.5900	1651.501	36385.46
2.5925	1658.752	36650.32
2.5950	1666.030	36916.89
2.5975	1673.334	37185.16
2.6000	1680.663	37455.16
2.6025	1688.019	37726.87
2.6050	1695.401	38000.33
2.6075	1702.809	38275.53
2.6100	1710.244	38552.50
2.6125	1717.704	38831.22
2.6150	1725.192	39111.72
2.6175	1732.705	39394.01
2.6200	1740.245	39678.09
2.6225	1747.812	39963.98
2.6250	1755.406	40251.68
2.6275	1763.026	40541.21
2.6300	1770.673	40832.57
2.6325	1778.348	41125.70
2.6350	1786.049	41420.84
2.6375	1793.777	41717.77
2.6400	1801.532	42015.57
2.6425	1809.315	42317.26
2.6450	1817.125	42619.85
2.6475	1824.962	42924.33
2.6500	1832.827	43230.74
2.6525	1840.719	43539.07
2.6550	1848.639	43849.34
2.6575	1856.586	44161.56
2.6600	1864.561	44475.74
2.6625	1872.564	44791.88
2.6650	1880.595	45110.00
2.6675	1888.653	45430.12
2.6700	1896.740	45752.23
2.6725	1904.855	46076.36
2.6750	1912.998	46402.51
2.6775	1921.169	46730.69
2.6800	1929.368	47060.91
2.6825	1937.596	47393.19
2.6850	1945.853	47727.54
2.6875	1954.138	48063.96
2.6900	1962.451	48402.48
2.6925	1970.793	48743.09
2.6950	1979.164	49085.31
2.6975	1987.564	49430.65
2.7000	1995.993	49777.63
2.7025	2004.450	50126.75
2.7050	2012.937	50478.03
2.7075	2021.453	50831.47

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
2.7100	2029.998	51187.10
2.7125	2038.572	51544.91
2.7150	2047.176	51904.93
2.7175	2055.809	52267.16
2.7200	2064.471	52631.61
2.7225	2073.164	52998.31
2.7250	2081.885	53367.25
2.7275	2090.637	53738.45
2.7300	2099.418	54111.93
2.7325	2108.230	54487.69
2.7350	2117.071	54865.74
2.7375	2125.942	55246.11
2.7400	2134.844	55628.80
2.7425	2143.775	56013.82
2.7450	2152.737	56401.18
2.7475	2161.730	56790.91
2.7500	2170.752	57183.00
2.7525	2179.806	57577.48
2.7550	2188.889	57974.35
2.7575	2198.004	58373.63
2.7600	2207.149	58775.33
2.7625	2216.325	59179.46
2.7650	2225.532	59586.04
2.7675	2234.770	59995.07
2.7700	2244.039	60406.58
2.7725	2253.339	60820.57
2.7750	2262.671	61237.05
2.7775	2272.033	61656.05
2.7800	2281.427	62077.57
2.7825	2290.853	62501.62
2.7850	2300.310	62928.22
2.7875	2309.798	63357.39
2.7900	2319.319	63789.13
2.7925	2328.871	64223.46
2.7950	2338.455	64660.39
2.7975	2348.070	65099.93
2.8000	2357.718	65542.11
2.8025	2367.398	65985.92
2.8050	2377.110	66434.40
2.8075	2386.855	66884.54
2.8100	2396.632	67337.36
2.8125	2406.441	67792.88
2.8150	2416.282	68251.11
2.8175	2426.156	68712.07
2.8200	2436.063	69175.77
2.8225	2446.003	69642.21
2.8250	2455.975	70111.43
2.8275	2465.981	70583.42
2.8300	2476.019	71058.21

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_5
2.8325	2486.091	71535.81
2.8350	2496.195	72016.23
2.8375	2506.333	72499.49
2.8400	2516.504	72985.61
2.8425	2526.708	73474.58
2.8450	2536.946	73960.44
2.8475	2547.218	74461.20
2.8500	2557.523	74958.86
2.8525	2567.862	75459.45
2.8550	2578.235	75962.99
2.8575	2588.641	76469.47
2.8600	2599.082	76978.93
2.8625	2609.557	77491.36
2.8650	2620.065	78006.80
2.8675	2630.608	78525.26
2.8700	2641.186	79046.74
2.8725	2651.798	79571.27
2.8750	2662.444	80098.86
2.8775	2673.125	80629.52
2.8800	2683.840	81163.28
2.8825	2694.590	81700.14
2.8850	2705.375	82240.13
2.8875	2716.195	82783.25
2.8900	2727.050	83329.52
2.8925	2737.940	83878.97
2.8950	2748.865	84431.60
2.8975	2759.826	84987.43
2.9000	2770.821	85546.47
2.9025	2781.852	86108.75
2.9050	2792.919	86674.28
2.9075	2804.021	87243.08
2.9100	2815.159	87815.15
2.9125	2826.333	88390.52
2.9150	2837.542	88969.21
2.9175	2848.788	89551.23
2.9200	2850.069	90136.59
2.9225	2871.387	90725.31
2.9250	2882.741	91317.42
2.9275	2894.131	91912.92
2.9300	2905.557	92511.84
2.9325	2917.020	93114.13
2.9350	2928.519	93719.97
2.9375	2940.056	94329.23
2.9400	2951.628	94941.97
2.9425	2963.238	95558.20
2.9450	2974.834	96177.95
2.9475	2986.568	96801.23
2.9500	2998.209	97428.06
2.9525	3010.046	98056.46

Table 3 (Continued)

(d) $-1.0200 \leq \xi \leq 3.1250$

ξ	δ_4	y_5
2.9550	3021.841	98692.44
2.9575	3033.674	99330.03
2.9600	3045.543	99971.23
2.9625	3057.451	100616.0
2.9650	3069.395	101264.5
2.9675	3081.378	101916.7
2.9700	3093.398	102572.6
2.9725	3105.457	103232.1
2.9750	3117.553	103895.4
2.9775	3129.687	104562.4
2.9800	3141.859	105233.3
2.9825	3154.070	105907.8
2.9850	3166.319	106586.2
2.9875	3178.606	107268.4
2.9900	3190.932	107954.4
2.9925	3203.297	108644.3
2.9950	3215.700	109338.1
2.9975	3228.142	110035.8
3.0000	3240.623	110737.3
3.0025	3253.143	111442.8
3.0050	3265.701	112152.3
3.0075	3278.299	112865.7
3.0100	3290.937	113583.1
3.0125	3303.613	114304.5
3.0150	3316.329	115029.9
3.0175	3329.085	115759.4
3.0200	3341.880	116492.9
3.0225	3354.715	117230.5
3.0250	3367.589	117972.2
3.0275	3380.504	118718.1
3.0300	3393.458	119468.0
3.0325	3406.453	120222.2
3.0350	3419.488	120980.5
3.0375	3432.562	121743.0
3.0400	3445.678	122509.8
3.0425	3458.834	123280.8
3.0450	3472.030	124056.0
3.0475	3485.267	124835.5
3.0500	3498.544	125619.4
3.0525	3511.863	126407.5
3.0550	3525.222	127200.0
3.0575	3538.623	127996.9
3.0600	3552.064	128798.1
3.0625	3565.547	129603.8
3.0650	3579.071	130413.9
3.0675	3592.636	131228.4
3.0700	3606.243	132047.4
3.0725	3619.891	132870.8
3.0750	3633.582	133698.8

Table 3 (Continued)

(d) $-1.0200 \leqslant \xi \leqslant 3.1250$

ξ	δ_4	y_8
3.0775	3647.313	134531.3
3.0800	3661.087	135368.4
3.0825	3674.903	136210.0
3.0850	3688.761	137056.3
3.0875	3702.661	137907.1
3.0900	3716.603	138762.6
3.0925	3730.587	139622.7
3.0950	3744.614	140487.6
3.0975	3758.684	141357.1
3.1000	3772.796	142231.3
3.1025	3786.951	143110.3
3.1050	3801.149	143994.1
3.1075	3815.389	144882.7
3.1100	3829.673	145776.0
3.1125	3844.000	146674.3
3.1150	3858.370	147577.3
3.1175	3872.783	148485.3
3.1200	3887.240	149398.1
3.1225	3901.740	150315.9
3.1250	3916.284	151238.6

Table 3 (Continued)

(e) $-0.2000 \leq \xi \leq 3.1250$

ξ	θ_4	θ_5
- .0150	.702664	
- .0200	.693904	1.312407
- .0250	.685364	1.273504
- .0300	.677039	1.235806
- .0350	.668961	1.198853
- .0400	.661034	1.163633
- .0450	.653357	1.129022
- .0500	.645844	1.095735
- .0550	.638549	1.063290
- .0600	.631470	1.031680
- .0650	.624571	1.000076
- .0700	.617653	.971406
- .0750	.611341	.942516
- .0800	.605004	.914504
- .0850	.598852	.887289
- .0900	.592808	.860829
- .0950	.587096	.835140
- .1000	.581481	.810180
- .1050	.576041	.785920
- .1100	.570770	.762340
- .1150	.565668	.739430
- .1200	.560729	.717170
- .1250	.555957	.695510
- .1300	.551346	.674444
- .1350	.546297	.653961
- .1400	.542602	.634040
- .1450	.538463	.614659
- .1500	.534475	.595802
- .1550	.530639	.577453
- .1600	.526952	.559571
- .1650	.523413	.542202
- .1700	.520018	.525283
- .1750	.516767	.508782
- .1800	.513657	.492719
- .1850	.510687	.477067
- .1900	.507855	.461814
- .1950	.505158	.446947
- .2000	.502598	.432450

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_s	θ_s
.0125	.754925	1.619790
.0150	.760031	1.644444
.0175	.765196	1.669343
.0200	.770424	1.694780
.0225	.775718	1.720496
.0250	.781071	1.746604
.0275	.786487	1.773151
.0300	.791968	1.800069
.0325	.797512	1.827404
.0350	.803119	1.855174
.0375	.808793	1.883387
.0400	.814533	1.912020
.0425	.8203385	1.941089
.0450	.8262104	1.970604
.0475	.8321496	2.000607
.0500	.8381566	2.030058
.0525	.8442318	2.061976
.0550	.8503759	2.093382
.0575	.8565896	2.125272
.0600	.8628728	2.157651
.0625	.8692263	2.190541
.0650	.8756509	2.223938
.0675	.8821472	2.257853
.0700	.8887156	2.292296
.0725	.8953565	2.327256
.0750	.9020708	2.362795
.0775	.9088588	2.398872
.0800	.9157213	2.435506
.0825	.9226588	2.472692
.0850	.9296720	2.510499
.0875	.9367613	2.548871
.0900	.9439274	2.587843
.0925	.9511710	2.627418
.0950	.9584926	2.667615
.0975	.9658929	2.708434
.1000	.9733725	2.749894
.1025	.9809320	2.791990
.1050	.9885720	2.834757
.1075	.9962931	2.878184
.1100	1.004096	2.922286
.1125	1.011981	2.967077
.1150	1.019950	3.012549
.1175	1.028002	3.058768
.1200	1.036139	3.105689
.1225	1.044361	3.153341
.1250	1.052669	3.201717
.1275	1.061063	3.250508
.1300	1.069544	3.300805
.1325	1.078113	

Table 3 (Continued)

[illegible]

ξ	θ_3	θ_5
.1350	1.086771	3.351499
.1375	1.095518	3.402986
.1400	1.104355	3.455277
.1425	1.113282	3.508383
.1450	1.122301	3.562318
.1475	1.131412	3.617095
.1500	1.140616	3.672727
.1525	1.149914	3.729224
.1550	1.159305	3.786604
.1575	1.168792	3.844857
.1600	1.178374	3.903060
.1625	1.188053	3.964165
.1650	1.197830	4.025207
.1675	1.207704	4.087201
.1700	1.217677	4.150169
.1725	1.227750	4.214102
.1750	1.237923	4.278042
.1775	1.248198	4.344989
.1800	1.258574	4.411964
.1825	1.269053	4.479985
.1850	1.279636	4.548044
.1875	1.290323	4.619219
.1900	1.301115	4.690463
.1925	1.312013	4.752815
.1950	1.323018	4.836295
.1975	1.334131	4.910917
.2000	1.345352	4.986698
.2025	1.356683	5.063657
.2050	1.368123	5.141814
.2075	1.379675	5.221181
.2100	1.391339	5.301785
.2125	1.403116	5.383639
.2150	1.415006	5.456763
.2175	1.427010	5.551174
.2200	1.439131	5.636897
.2225	1.451367	5.723350
.2250	1.463721	5.812350
.2275	1.476193	5.902120
.2300	1.488783	5.992280
.2325	1.501494	6.085853
.2350	1.514326	6.179859
.2375	1.527279	6.275313
.2400	1.540355	6.372253
.2425	1.553555	6.470684
.2450	1.566879	6.570636
.2475	1.580329	6.672118
.2500	1.593906	6.775199
[illegible]	1.607610	6.879859
.2550	1.621442	6.986129

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_s	θ_s
.2575	1.635404	7.093038
.2600	1.649496	7.203610
.2625	1.663720	7.314871
.2650	1.678076	7.427841
.2675	1.692565	7.542552
.2700	1.707189	7.658023
.2725	1.721948	7.777293
.2750	1.736844	7.897355
.2775	1.751877	8.019247
.2800	1.767049	8.143029
.2825	1.782360	8.268761
.2850	1.797812	8.396425
.2875	1.813405	8.525006
.2900	1.829141	8.657573
.2925	1.845021	8.790153
.2950	1.861046	8.926778
.2975	1.877216	9.064474
.3000	1.893534	9.204276
.3025	1.909999	9.346213
.3050	1.926614	9.490318
.3075	1.943380	9.636618
.3100	1.960296	9.785151
.3125	1.977365	9.935949
.3150	1.994588	10.08903
.3175	2.011965	10.24446
.3200	2.029499	10.40224
.3225	2.047189	10.56242
.3250	2.065038	10.72504
.3275	2.083046	10.89012
.3300	2.101215	11.05771
.3325	2.119545	11.22784
.3350	2.138038	11.40054
.3375	2.156695	11.57587
.3400	2.175518	11.75384
.3425	2.194507	11.93450
.3450	2.213664	12.11789
.3475	2.232989	12.30305
.3500	2.252485	12.49202
.3525	2.272152	12.68485
.3550	2.291991	12.87952
.3575	2.312005	13.07718
.3600	2.332193	13.27779
.3625	2.352558	13.48142
.3650	2.373100	13.68810
.3675	2.393821	13.89789
.3700	2.414722	14.11082
.3725	2.435805	14.32695
.3750	2.457070	14.54631
.3775	2.478519	14.76895

Table 3 (Continued)

(e) $-0.2000 \leq \xi \leq 3.1250$

ξ	θ_3	θ_5
.3800	2.499174	14.99292
.3825	2.521975	15.22424
.3850	2.543964	15.45704
.3875	2.566182	15.69328
.3900	2.588570	15.93304
.3925	2.611151	16.17637
.3950	2.633925	16.42333
.3975	2.656893	16.67395
.4000	2.680058	16.92830
.4025	2.703419	17.18642
.4050	2.726980	17.44837
.4075	2.750740	17.71421
.4100	2.774702	17.98398
.4125	2.798867	18.25774
.4150	2.823236	18.53554
.4175	2.847811	18.81745
.4200	2.872592	19.10352
.4225	2.897583	19.39381
.4250	2.922783	19.68836
.4275	2.948194	19.98726
.4300	2.973819	20.29065
.4325	2.999657	20.59820
.4350	3.025712	20.91056
.4375	3.051983	21.22740
.4400	3.078474	21.54888
.4425	3.105184	21.87440
.4450	3.132116	22.20503
.4475	3.159271	22.54183
.4500	3.186651	22.88252
.4525	3.214257	23.22819
.4550	3.242091	23.57888
.4575	3.270154	23.93369
.4600	3.298448	24.29565
.4625	3.326974	24.66190
.4650	3.355734	25.03344
.4675	3.384729	25.41037
.4700	3.413961	25.79276
.4725	3.443432	26.17968
.4750	3.473143	26.57421
.4775	3.503095	26.97344
.4800	3.533291	27.37841
.4825	3.563731	27.76922
.4850	3.594419	28.20596
.4875	3.625354	28.62869
.4900	3.656539	29.05749
.4925	3.687975	29.49246
.4950	3.719665	29.93367
.4975	3.751609	30.38119
.5000	3.783809	30.83513

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_3	θ_5
.5025	3.816267	31.29555
.5050	3.848985	31.76256
.5075	3.881965	32.23623
.5100	3.915207	32.71665
.5125	3.948714	33.20392
.5150	3.982487	33.69812
.5175	4.016529	34.19935
.5200	4.050840	34.70768
.5225	4.085423	35.22324
.5250	4.120279	35.74608
.5275	4.155410	36.27636
.5300	4.190818	36.81412
.5325	4.226504	37.35947
.5350	4.262471	37.91252
.5375	4.298720	38.47337
.5400	4.335252	39.04211
.5425	4.372070	39.61885
.5450	4.409176	40.20369
.5475	4.446570	40.79575
.5500	4.484256	41.39811
.5525	4.522234	42.00790
.5550	4.560507	42.62621
.5575	4.599077	43.25316
.5600	4.637945	43.88889
.5625	4.677113	44.53346
.5650	4.716583	45.18601
.5675	4.756356	45.84965
.5700	4.796436	46.52147
.5725	4.836823	47.20168
.5750	4.877520	47.89330
.5775	4.918528	48.59249
.5800	4.959849	49.30334
.5825	5.001486	50.02205
.5850	5.043439	50.75266
.5875	5.085712	51.49235
.5900	5.128306	52.24222
.5925	5.171222	53.00240
.5950	5.214464	53.77302
.5975	5.258032	54.55423
.6000	5.301929	55.34614
.6025	5.346157	56.14890
.6050	5.390717	56.96265
.6075	5.435612	57.78750
.6100	5.480844	58.62361
.6125	5.526415	59.47112
.6150	5.572326	60.33017
.6175	5.618580	61.20091
.6200	5.665179	62.08346
.6225	5.712124	62.97799

Table 3 (Continued)

(e) $-0.2000 \leq \xi \leq 3.1250$

ξ	θ_s	θ_e
.6250	5.759418	63.88465
.6275	5.807064	64.80358
.6300	5.855062	65.73493
.6325	5.903415	66.67885
.6350	5.952125	67.63551
.6375	6.001195	68.60404
.6400	6.050626	69.56764
.6425	6.100420	70.56342
.6450	6.150579	71.59261
.6475	6.201106	72.61530
.6500	6.252003	73.65169
.6525	6.303272	74.70094
.6550	6.354914	75.76622
.6575	6.406933	76.84469
.6600	6.459330	77.93755
.6625	6.512107	79.04494
.6650	6.565267	80.16708
.6675	6.618812	81.30410
.6700	6.672743	82.45620
.6725	6.727064	83.62357
.6750	6.781776	84.80638
.6775	6.836882	86.00482
.6800	6.892383	87.21808
.6825	6.948282	88.44933
.6850	7.004582	89.69579
.6875	7.061284	90.95864
.6900	7.1[illegible]8391	92.23807
.6925	7.175905	93.53428
.6950	7.233828	94.84748
.6975	7.292162	96.17786
.7000	7.350910	97.52562
.7025	7.410075	98.89098
.7050	7.469657	100.2741
.7075	7.529661	101.6742
.7100	7.590087	103.0946
.7125	7.650939	104.5324
.7150	7.712218	105.9889
.7175	7.773927	107.4642
.7200	7.836069	108.9586
.7225	7.898645	110.4724
.7250	7.961659	112.0056
.7275	8.025111	113.5587
.7300	8.089006	115.1317
.7325	8.153344	116.7249
.7350	8.218130	118.3386
.7375	8.283364	119.9730
.7400	8.349049	121.6284
.7425	8.415189	123.3049
.7450	8.481784	125.0028

Table 3 (Continued)

(e) $-0.2000 \leq \xi \leq 3.1250$

ξ	θ_3	θ_5
.7475	8.548838	126.7223
.7500	8.616554	128.4629
.7525	8.684333	130.2275
.7550	8.752777	132.0136
.7575	8.821691	133.8223
.7600	8.891075	135.6540
.7625	8.960937	137.5089
.7650	9.031266	139.3872
.7675	9.102078	141.2893
.7700	9.173371	143.2152
.7725	9.245147	145.1656
.7750	9.317409	147.1395
.7775	9.390160	149.1401
.7800	9.463402	151.1649
.7825	9.537137	153.2140
.7850	9.611368	155.2908
.7875	9.686098	157.3924
.7900	9.761329	159.5204
.7925	9.837065	161.6749
.7950	9.913306	163.8562
.7975	9.990057	166.0647
.8000	10.06731	168.3005
.8025	10.14509	170.5641
.8050	10.22338	172.8558
.8075	10.30220	175.1757
.8100	10.38153	177.5243
.8125	10.46139	179.9010
.8150	10.54178	182.3089
.8175	10.62269	184.7454
.8200	10.70414	187.2119
.8225	10.78613	189.7086
.8250	10.86865	192.2367
.8275	10.95172	194.7943
.8300	11.03532	197.3838
.8325	11.11948	200.0050
.8350	11.20418	202.6581
.8375	11.28943	205.3435
.8400	11.37524	208.0617
.8425	11.46161	210.8128
.8450	11.54853	213.5972
.8475	11.63602	216.4154
.8500	11.72407	219.2678
.8525	11.81270	222.1535
.8550	11.90189	225.0761
.8575	11.99165	228.0329
.8600	12.08200	231.0242
.8625	12.17292	234.0536
.8650	12.26442	237.1182
.8675	12.35651	240.2196

Table 3 (Continued)

(e) $-0.2000 \leq \xi \leq 3.1250$

ξ	θ_3	θ_5
.8700	12.44919	243.3581
.8725	12.54246	246.5341
.8750	12.63632	249.7481
.8775	12.73077	253.0004
.8800	12.82583	256.2914
.8825	12.92149	259.6215
.8850	13.01775	262.9912
.8875	13.11462	266.4007
.8900	13.21210	269.8508
.8925	13.31020	273.3416
.8950	13.40891	276.8736
.8975	13.50824	280.4473
.9000	13.60820	284.0631
.9025	13.70877	287.7214
.9050	13.80998	291.4227
.9075	13.91182	295.1675
.9100	14.01429	298.9550
.9125	14.11740	302.7880
.9150	14.22115	306.6667
.9175	14.32554	310.5897
.9200	14.43058	314.5584
.9225	14.53627	318.5733
.9250	14.64261	322.6349
.9275	14.74960	326.7436
.9300	14.85726	330.8999
.9325	14.96557	335.1044
.9350	15.07455	339.3575
.9375	15.18420	343.6596
.9400	15.29451	348.0114
.9425	15.40550	352.4133
.9450	15.51717	356.8658
.9475	15.62951	361.3694
.9500	15.74254	365.9247
.9525	15.85625	370.5322
.9550	15.97065	375.1923
.9575	16.08575	379.9057
.9600	16.20154	384.6729
.9625	16.31802	389.4943
.9650	16.43521	394.3706
.9675	16.55310	399.3024
.9700	16.67170	404.2900
.9725	16.79101	409.3342
.9750	16.91104	414.4355
.9775	17.03178	419.5944
.9800	17.15324	424.8115
.9825	17.27543	430.0874
.9850	17.39834	35.4227
.9875	17.52198	440.8180
.9900	17.64636	446.2738

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	φ_5	θ_5
.9925	17.77147	451.7908
.9950	17.89732	457.3696
.9975	18.02391	463.0107
1.0000	18.15125	468.7148
1.0025	18.27934	474.4824
1.0050	18.40818	480.3140
1.0075	18.53778	486.2111
1.0100	18.66814	492.1715
1.0125	18.79925	498.2016
1.0150	18.93114	504.2968
1.0175	19.06379	510.4593
1.0200	19.19722	516.6589
1.0225	19.33142	522.9891
1.0250	19.46640	529.3579
1.0275	19.60216	535.7967
1.0300	19.73871	542.3062
1.0325	19.87605	548.8871
1.0350	20.01418	555.5401
1.0375	20.15310	562.2659
1.0400	20.29282	569.0651
1.0425	20.43335	575.9386
1.0450	20.57468	582.8860
1.0475	20.71683	589.9110
1.0500	20.85978	597.0113
1.0525	21.00355	604.1887
1.0550	21.14814	611.4439
1.0575	21.29355	618.7776
1.0600	21.43979	626.1906
1.0625	21.58686	633.6836
1.0650	21.73476	641.2574
1.0675	21.88350	648.9128
1.0700	22.03308	656.6494
1.0725	22.16351	664.4711
1.0750	22.33478	672.3757
1.0775	22.48690	680.3649
1.0800	22.63987	688.4396
1.0825	22.79371	696.6005
1.0850	22.94840	704.8484
1.0875	23.10396	713.1842
1.0900	23.26039	721.6087
1.0925	23.41768	730.1226
1.0950	23.57586	738.7269
1.0975	23.73491	747.4223
1.1000	23.89485	756.2097
1.1025	24.05567	765.0899
1.1050	24.21738	774.0639
1.1075	24.37999	783.1324
1.1100	24.54349	792.2964
1.1125	24.70789	801.5566

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_3	θ_5
1.1150	24.87320	810.9141
1.1175	25.03941	820.3696
1.1200	25.20694	829.9841
1.1225	25.37458	839.5783
1.1250	25.54354	849.3336
1.1275	25.71342	859.1904
1.1300	25.88423	869.1498
1.1325	26.05597	879.2129
1.1350	26.22864	889.3804
1.1375	26.40224	899.6533
1.1400	26.57679	910.0326
1.1425	26.75228	920.5193
1.1450	26.92873	931.1142
1.1475	27.10612	941.8185
1.1500	27.28447	952.6320
1.1525	27.46377	963.5587
1.1550	27.64404	974.5967
1.1575	27.82528	985.7479
1.1600	28.00749	997.0134
1.1625	28.19067	1008.394
1.1650	28.37483	1019.891
1.1675	28.55998	1031.505
1.1700	28.74610	1043.238
1.1725	28.93322	1055.090
1.1750	29.12133	1067.062
1.1775	29.31044	1079.157
1.1800	29.50055	1091.373
1.1825	29.69166	1103.714
1.1850	29.88379	1116.179
1.1875	30.07692	1128.770
1.1900	30.27107	1141.488
1.1925	30.46624	1154.334
1.1950	30.66244	1167.309
1.1975	30.85966	1180.415
1.2000	31.05792	1193.651
1.2025	31.25721	1207.021
1.2050	31.45754	1220.525
1.2075	31.65891	1234.163
1.2100	31.86133	1247.937
1.2125	32.06480	1261.849
1.2150	32.26933	1275.899
1.2175	32.47492	1290.089
1.2200	32.68157	1304.419
1.2225	32.88929	1318.892
1.2250	33.09808	1333.507
1.2275	33.30794	1348.267
1.2300	33.51888	1363.173
1.2325	33.73091	1378.226
1.2350	33.94402	1393.427

Table 3 (Continued)

(e) $-0.2000 \leq \xi \leq 3.1250$

ξ	θ_3	θ_5
1.2375	34.15822	1408.776
1.2400	34.37352	1424.279
1.2425	34.58992	1439.933
1.2450	34.80742	1455.739
1.2475	35.02603	1471.701
1.2500	35.24575	1487.818
1.2525	35.46658	1504.092
1.2550	35.68854	1520.525
1.2575	35.91161	1537.118
1.2600	36.13582	1553.872
1.2625	36.36116	1570.789
1.2650	36.58763	1587.870
1.2675	36.81524	1605.116
1.2700	37.04399	1622.528
1.2725	37.27390	1640.109
1.2750	37.50495	1657.860
1.2775	37.73716	1675.780
1.2800	37.97053	1693.875
1.2825	38.20507	1712.141
1.2850	38.44078	1730.584
1.2875	38.67765	1749.204
1.2900	38.91571	1768.001
1.2925	39.15494	1786.978
1.2950	39.39536	1806.136
1.2975	39.63697	1825.477
1.3000	39.87978	1845.001
1.3025	40.12378	1864.711
1.3050	40.36398	1884.608
1.3075	40.61540	1904.694
1.3100	40.86302	1924.970
1.3125	41.11185	1945.438
1.3150	41.36191	1966.099
1.3175	41.61319	1986.955
1.3200	41.[illegible]	2008.007
1.3225	42.11943	2029.257
1.3250	42.37440	2050.707
1.3275	42.63062	2072.358
1.3300	42.88808	2094.212
1.3325	43.14678	2116.271
1.3350	43.40674	2138.535
1.3375	43.66796	2161.008
1.3400	43.93044	2182.690
1.3425	44.19419	2206.562
1.3450	44.45921	2229.687
1.3475	44.72550	2253.009
1.3500	44.99307	2276.545
1.3525	45.26193	2300.300
1.3550	45.53207	2324.274
1.3575	45.803[illegible]1	2348.470

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_3	θ_g
1.3600	46.07624	2372.889
1.3625	46.35028	2397.533
1.3650	46.62562	2422.404
1.3675	46.90227	2447.503
1.3700	47.18023	2472.833
1.3725	47.45951	2498.394
1.3750	47.74012	2524.191
1.3775	48.02205	2550.223
1.3800	48.30532	2576.492
1.3825	48.58992	2603.001
1.3850	48.87587	2629.751
1.3875	49.16316	2656.745
1.3900	49.45180	2683.984
1.3925	49.74179	2711.470
1.3950	50.03315	2739.206
1.3975	50.32586	2767.192
1.4000	50.61995	2795.431
1.4025	50.91541	2823.925
1.4050	51.21224	2852.677
1.4075	51.51046	2881.686
1.4100	51.81006	2910.957
1.4125	52.11105	2940.491
1.4150	52.41344	2970.290
1.4175	52.71723	3000.355
1.4200	53.02242	3030.690
1.4225	53.32903	3061.295
1.4250	53.63704	3092.174
1.4275	53.94647	3123.328
1.4300	54.25733	3154.760
1.4325	54.56961	3186.470
1.4350	54.88333	3218.463
1.4375	55.19848	3250.739
1.4400	55.51508	3283.301
1.4425	55.83312	3316.151
1.4450	56.15261	3349.291
1.4475	56.47355	3382.724
1.4500	56.79596	3416.452
1.4525	57.11983	3450.476
1.4550	57.44517	3484.799
1.4575	57.77198	3519.424
1.4600	58.10027	3554.352
1.4625	58.43005	3589.585
1.4650	58.76131	3625.123
1.4675	59.09407	3660.982
1.4700	59.42832	3697.147
1.4725	59.76408	3733.628
1.4750	60.10134	3770.426
1.4775	60.44011	3807.545
1.4800	60.78040	3844.985

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_3	θ_5
1.4825	61.12221	3882.750
1.4850	61.46555	3920.842
1.4875	61.81042	3959.264
1.4900	62.15682	3998.017
1.4925	62.50477	4037.105
1.4950	62.85426	4076.530
1.4975	63.20530	4116.293
1.5000	63.55789	4156.399
1.5025	63.91205	4196.848
1.5050	64.26776	4237.646
1.5075	64.62505	4278.792
1.5100	64.98391	4320.290
1.5125	65.34435	4362.143
1.5150	65.70638	4404.353
1.5175	66.06999	4446.921
1.5200	66.43520	4489.854
1.5225	66.80200	4533.150
1.5250	67.17041	4576.814
1.5275	67.54043	4620.849
1.5300	67.91206	4665.256
1.5325	68.28531	4710.039
1.5350	68.66018	4755.200
1.5375	69.03668	4800.742
1.5400	69.41481	4846.669
1.5425	69.79458	4892.981
1.5450	70.17599	4939.684
1.5475	70.55905	4986.778
1.5500	70.94376	5034.267
1.5525	71.33013	5082.154
1.5550	71.71817	5130.442
1.5575	72.10787	5179.133
1.5600	72.49924	5228.230
1.5625	72.89229	5277.737
1.5650	73.28703	5327.655
1.5675	73.68345	5377.989
1.5700	74.08156	5428.741
1.5725	74.48137	5479.914
1.5750	74.88289	5531.510
1.5775	75.28611	5583.533
1.5800	75.69105	5635.988
1.5825	76.09770	5688.874
1.5850	76.50608	5742.197
1.5875	76.91618	5795.959
1.5900	77.32802	5850.162
1.5925	77.74159	5904.811
1.5950	78.15691	5959.905
1.5975	78.57398	6015.458
1.6000	78.99280	6071.462
1.6025	79.41336	6127.923

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_3	θ_5
[illegible]	[illegible]	[illegible]
1.6075	80.25984	6300.087
1.6100	80.68573	6358.410
1.6125	81.11340	6417.210
1.6150	81.54285	6476.486
1.6175	81.97409	6536.243
1.6200	82.40713	6596.483
1.6225	82.84196	6657.211
1.6250	83.27860	6718.429
1.6275	83.71705	6780.141
1.6300	84.15732	6842.350
1.6325	84.59941	6905.060
1.6350	85.04333	6968.274
1.6375	85.48907	7031.996
1.6400	85.93665	7096.229
1.6425	86.38608	7160.976
1.6450	86.83735	7226.241
1.6475	87.29047	7292.028
1.6500	87.74545	7358.340
1.6525	88.20230	7425.180
1.6550	88.66101	7492.553
1.6575	89.12160	7560.462
1.6600	89.58406	7628.910
1.6625	90.04841	7697.901
1.6650	90.51465	7767.438
1.6675	90.98278	7837.527
1.6700	91.45281	7908.170
1.6725	91.92475	7979.370
1.6750	92.39860	8051.132
1.6775	92.87437	8123.459
1.6800	93.35205	8196.356
1.6825	93.83167	8269.825
1.6850	94.31321	8343.872
1.6875	94.79669	8418.499
1.6900	95.28212	8493.710
1.6925	95.76949	8569.510
1.6950	96.25882	8645.902
1.6975	96.75011	8722.890
1.7000	97.24336	8800.478
1.7025	97.73858	8878.671
1.7050	98.23578	8957.472
1.7075	98.73496	9036.885
1.7100	99.23612	9116.914
1.7125	99.73928	9197.563
1.7150	100.2444	9278.837
1.7175	100.7515	9360.739
1.7200	101.2607	9443.274
1.7225	101.7719	9526.445
1.7250	102.2851	

Table 3 (Continued)

(e) $-0.2000 \leq \xi \leq 3.1250$

ξ	θ_1	θ_2
1.7275	102.8003	9610.257
1.7300	103.3176	9694.714
1.7325	103.8368	9779.821
1.7350	104.3582	9865.581
1.7375	104.8815	9951.998
1.7400	105.4070	10039.07
1.7425	105.9345	10126.82
1.7450	106.4640	10215.24
1.7475	106.9956	10304.33
1.7500	107.5293	10394.10
1.7525	108.0651	10484.55
1.7550	108.6030	10575.70
1.7575	109.1429	10667.53
1.7600	109.6849	10760.07
1.7625	110.2291	10853.30
1.7650	110.7754	10947.24
1.7675	111.3237	11041.89
1.7700	111.8742	11137.26
1.7725	112.4268	11233.34
1.7750	112.9816	11330.15
1.7775	113.5385	11427.69
1.7800	114.0975	11525.96
1.7825	114.6587	11624.97
1.7850	115.2220	11724.73
1.7875	115.7875	11825.23
1.7900	116.3551	11926.48
1.7925	116.9249	12028.49
1.7950	117.4969	12131.27
1.7975	118.0711	12234.81
1.8000	118.6475	12339.12
1.8025	119.2260	12444.21
1.8050	119.8068	12550.08
1.8075	120.3857	12656.73
1.8100	120.9749	12764.18
1.8125	121.5623	12872.42
1.8150	122.1519	12981.47
1.8175	122.7437	13091.32
1.8200	123.3378	13201.98
1.8225	123.9341	13313.46
1.8250	124.5327	13425.76
1.8275	125.1335	13538.89
1.8300	125.7365	13652.85
1.8325	126.3418	13767.64
1.8350	126.9494	13883.28
1.8375	127.5593	13999.76
1.8400	128.1714	14117.10
1.8425	128.7859	14235.30
1.8450	129.4026	14354.36
1.8475	130.0216	14474.26

Table 3 (Continued)

(e) $-0.2000 \leq \xi \leq 3.1250$

ξ	θ_3	θ_5
1.8500	130.6429	14595.08
1.8525	131.2666	14716.76
1.8550	131.8925	14839.33
1.8575	132.5208	14962.78
1.8600	133.1514	15087.13
1.8625	133.7843	15212.38
1.8650	134.4196	15338.54
1.8675	135.0572	15465.61
1.8700	135.6971	15593.60
1.8725	136.3395	15722.51
1.8750	136.9841	15852.35
1.8775	137.6312	15983.13
1.8800	138.2806	16114.84
1.8825	138.9324	16247.50
1.8850	139.5866	16381.11
1.8875	140.2432	16515.68
1.8900	140.9021	16651.22
1.8925	141.5635	16787.72
1.8950	142.2273	16925.20
1.8975	142.8935	17063.66
1.9000	143.5622	17203.10
1.9025	144.2332	17343.54
1.9050	144.9067	17484.98
1.9075	145.5826	17627.42
1.9100	146.2610	17770.87
1.9125	146.9418	17915.34
1.9150	147.6251	18060.83
1.9175	148.3109	18207.35
1.9200	148.9991	18354.90
1.9225	149.6898	18503.50
1.9250	150.3830	18653.14
1.9275	151.0787	18803.84
1.9300	151.7766	18955.60
1.9325	152.4775	19108.42
1.9350	153.1807	19262.32
1.9375	153.8863	19417.29
1.9400	154.5945	19573.35
1.9425	155.3053	19730.51
1.9450	156.0185	19888.76
1.9475	156.7343	20048.11
1.9500	157.4527	20208.58
1.9525	158.1736	20370.16
1.9550	158.8970	20532.87
1.9575	159.6230	20696.71
1.9600	160.3516	20861.69
1.9625	161.0827	21027.81
1.9650	161.8165	21195.08
1.9675	162.5528	21363.51
1.9700	163.2917	21533.10

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_2	θ_5
1.9725	164.0332	21703.86
1.9750	164.7773	21875.81
1.9775	165.5241	22048.93
1.9800	166.2734	22223.25
1.9825	167.0254	22398.77
1.9850	167.7800	22575.49
1.9875	168.5372	22753.42
1.9900	169.2971	22932.58
1.9925	170.0597	23112.96
1.9950	170.8248	23294.57
1.9975	171.5927	23477.43
2.0000	172.3632	23661.53
2.0025	173.1364	23846.89
2.0050	173.9123	24033.51
2.0075	174.6908	24221.40
2.0100	175.4721	24410.57
2.0125	176.2560	24601.02
2.0150	177.0427	24792.76
2.0175	177.8321	24985.80
2.0200	178.6242	25180.15
2.0225	179.4190	25375.81
2.0250	180.2165	25572.79
2.0275	181.0168	25771.10
2.0300	181.8199	25970.75
2.0325	182.6256	26171.74
2.0350	183.4342	26374.08
2.0375	184.2455	26577.78
2.0400	185.0595	26782.85
2.0425	185.8764	26989.29
2.0450	186.6960	27197.11
2.0475	187.5184	27406.33
2.0500	188.3437	27616.94
2.0525	189.1717	27828.96
2.0550	190.0025	28042.39
2.0575	190.8361	28257.24
2.0600	191.6726	28473.52
2.0625	192.5119	28691.24
2.0650	193.3540	28910.41
2.0675	194.1990	29131.03
2.0700	195.0468	29353.11
2.0725	195.8975	29576.65
2.0750	196.7510	29801.59
2.0775	197.6074	30028.20
2.0800	198.4667	30256.21
2.0825	199.3288	30485.72
2.0850	200.1939	30716.75
2.0875	201.0618	30949.29
2.0900	201.9326	31183.36
2.0925	202.8063	31418.97

Table 3 (Continued)

(e) $-0.2000 \leq \xi \leq 3.1250$

ξ	θ_3	θ_5
2.0950	203.6830	31656.12
2.0975	204.5626	31894.82
2.1000	205.4451	32135.09
2.1025	206.3305	32376.93
2.1050	207.2188	32620.35
2.1075	208.1102	32865.35
2.1100	209.0044	33111.99
2.1125	209.9016	33360.16
2.1150	210.8018	33609.98
2.1175	211.7050	33861.43
2.1200	212.6111	34114.50
2.1225	213.5202	34369.22
2.1250	214.4324	34625.59
2.1275	215.3475	34883.61
2.1300	216.2656	35143.30
2.1325	217.1867	35404.67
2.1350	218.1109	35667.73
2.1375	219.0381	35932.48
2.1400	219.9683	36198.93
2.1425	220.9015	36467.10
2.1450	221.8378	36736.99
2.1475	222.7772	37008.61
2.1500	223.7196	37281.97
2.1525	224.6650	37557.09
2.1550	225.6136	37833.96
2.1575	226.5652	38112.61
2.1600	227.5199	38393.03
2.1625	228.4777	38675.24
2.1650	229.4386	38959.25
2.1675	230.4026	39245.07
2.1700	231.3698	39532.70
2.1725	232.3400	39822.16
2.1750	233.3134	40113.46
2.1775	234.2899	40406.61
2.1800	235.2695	40701.61
2.1825	236.2523	40998.47
2.1850	237.2382	41297.22
2.1875	238.2274	41597.85
2.1900	239.2196	41900.38
2.1925	240.2151	42204.81
2.1950	241.2137	42511.16
2.1975	242.2155	42819.44
2.2000	243.2205	43129.65
2.2025	244.2287	43441.81
2.2050	245.2402	43755.93
2.2075	246.2548	44072.01
2.2100	247.2727	44390.08
2.2125	248.2938	44710.13
2.2150	249.3181	45032.18

Table 3 (Continued)

(e) $-0.2000 \leq \xi \leq 3.1250$

ξ	θ_3	θ_5
2.2175	250.3457	45356.24
2.2200	251.3765	45682.32
2.2225	252.4106	46010.42
2.2250	253.4479	46340.57
2.2275	254.4885	46672.77
2.2300	255.5324	47007.04
2.2325	256.5796	47343.37
2.2350	257.6301	47681.79
2.2375	258.6838	48022.31
2.2400	259.7409	48364.93
2.2425	260.8013	48709.66
2.2450	261.8650	49056.53
2.2475	262.9320	49405.53
2.2500	264.0024	49756.68
2.2525	265.0761	50109.99
2.2550	266.1532	50465.47
2.2575	267.2336	50823.14
2.2600	268.3173	51183.00
2.2625	269.4045	51545.07
2.2650	270.4950	51909.35
2.2675	271.5889	52275.86
2.2700	272.6862	52644.61
2.2725	273.7869	53015.62
2.2750	274.8910	53388.88
2.2775	275.9985	53764.42
2.2800	277.1094	54142.24
2.2825	278.2238	54522.36
2.2850	279.3416	54904.79
2.2875	280.4628	55289.55
2.2900	281.5875	55676.63
2.2925	282.7156	56066.06
2.2950	283.8472	56457.84
2.2975	284.9822	56852.00
2.3000	286.1208	57248.53
2.3025	287.2628	57647.46
2.3050	288.4083	58048.79
2.3075	289.5573	58452.54
2.3100	290.7098	58858.72
2.3125	291.8658	59267.33
2.3150	293.0253	59678.41
2.3175	294.1884	60091.94
2.3200	29[illegible]750	60507.96
2.3225	296.[illegible]451	60925.47
2.3250	297.6988	61347.48
2.3275	298.8760	61771.00
2.3300	300.0568	62197.05
2.3325	301.2412	62625.65
2.3350	302.4291	63056.80
2.3375	303.6207	63490.51

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_3	θ_5
2.3400	304.8158	63926.81
2.3425	306.0145	64365.69
2.3450	307.2168	64807.19
2.3475	308.4228	65251.29
2.3500	309.6323	65698.03
2.3525	310.8455	66147.42
2.3550	312.0623	66599.46
2.3575	313.2828	67054.17
2.3600	314.5069	67511.57
2.3625	315.7346	67971.66
2.3650	316.9661	68434.46
2.3675	318.2012	68899.99
2.3700	319.4399	69368.25
2.3725	320.6824	69839.26
2.3750	321.9286	70313.04
2.3775	323.1784	70789.59
2.3800	324.4320	71268.94
2.3825	325.6893	71751.09
2.3850	326.9503	72236.05
2.3875	328.2150	72723.86
2.3900	329.4835	73214.50
2.3925	330.7557	73708.01
2.3950	332.0317	74204.39
2.3975	333.3114	74703.66
2.4000	334.5949	75205.83
2.4025	335.8822	75710.92
2.4050	337.1732	76216.94
2.4075	338.4681	76729.90
2.4100	339.7667	77243.82
2.4125	341.0692	77760.71
2.4150	342.3754	78280.60
2.4175	343.6855	78803.49
2.4200	344.9994	79329.38
2.4225	346.3171	79858 32
2.4250	347.6387	80390.30
2.4275	348.9641	80925.33
2.4300	350.2934	81463.45
2.4325	351.6266	82004.65
2.4350	352.9636	82548.96
2.4375	354.3045	83096.39
2.4400	355.6493	83646.96
2.4425	356.9980	84200.67
2.4450	358.3506	84757.55
2.4475	359.7071	85317.61
2.4500	361.0675	85880.86
2.4525	362.4318	86447.32
2.4550	363.8001	87017.01
2.4575	365.1723	87589.95
2.4600	366.5484	88166.13

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_3	θ_5
2.4625	367.9286	88745.59
2.4650	369.3126	89328.34
2.4675	370.7007	89914.39
2.4700	372.0927	90503.76
2.4725	373.4887	91096.47
2.4750	374.8887	91692.52
2.4775	376.2927	92291.94
2.4800	377.7007	92894.74
2.4825	379.1128	93500.95
2.4850	380.5288	94110.56
2.4875	381.9489	94723.61
2.4900	383.3730	95340.10
2.4925	384.8012	95960.05
2.4950	386.2334	96583.49
2.4975	387.6697	97210.41
2.5000	389.1101	97840.85
2.5025	390.5545	98474.82
2.5050	392.0030	99112.33
2.5075	393.4556	99753.41
2.5100	394.9124	100398.0
2.5125	396.3732	101046.3
2.5150	397.8381	101698.1
2.5175	399.3072	102353.6
2.5200	400.7804	103012.7
2.5225	402.2577	103675.5
2.5250	403.7392	104342.0
2.5275	405.2248	105012.2
2.5300	406.7146	105686.0
2.5325	408.2086	106363.6
2.5350	409.7068	107045.0
2.5375	411.2091	107730.1
2.5400	412.7156	108419.0
2.5425	414.2264	109111.7
2.5450	415.7413	109806.2
2.5475	417.2605	110508.6
2.5500	418.7839	111212.8
2.5525	420.3115	111920.9
2.5550	421.8433	112632.8
2.5575	423.3795	113348.7
2.5600	424.9198	114068.5
2.5625	426.4545	114792.2
2.5650	428.0134	115519.9
2.5675	429.5666	116251.6
2.5700	431.1240	116987.3
2.5725	432.6858	117727.0
2.5750	434.2519	118470.7
2.5775	435.8223	119218.4
2.5800	437.3970	119970.3
2.5825	438.9760	120726.2

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_3	θ_5
2.5850	440.5594	121486.2
2.5875	442.1471	122250.4
2.5900	443.7302	123018.7
2.5925	445.3356	123791.1
2.5950	446.9364	124567.8
2.5975	448.5416	125348.6
2.6000	450.1511	126133.7
2.6025	451.7651	126923.0
2.6050	453.3834	127716.5
2.6075	455.0062	128514.3
2.6100	456.6333	129316.5
2.6125	458.2649	130122.9
2.6150	459.9010	130933.7
2.6175	461.5414	131748.8
2.6200	463.1863	132568.3
2.6225	464.8357	133392.2
2.6250	466.4895	134220.5
2.6275	468.1478	135053.3
2.6300	469.8106	135890.4
2.6325	471.4779	136732.1
2.6350	473.1497	137578.3
2.6375	474.8259	138428.9
2.6400	476.5067	139284.1
2.6425	478.1920	140143.9
2.6450	479.8819	141008.2
2.6475	481.5763	141877.1
2.6500	483.2752	142750.7
2.6525	484.9786	143628.8
2.6550	486.6867	144511.6
2.6575	488.3993	145399.1
2.6600	490.1164	146291.3
2.6625	491.8382	147188.2
2.6650	493.5646	148089.9
2.6675	495.2955	148996.3
2.6700	497.0311	149907.4
2.6725	498.7713	150823.4
2.6750	500.5161	151744.2
2.6775	502.2655	152669.8
2.6800	504.0196	153600.3
2.6825	505.7784	154535.7
2.6850	507.5418	155476.0
2.6875	509.3098	156421.2
2.6900	511.0826	157371.4
2.6925	512.8600	158326.5
2.6950	514.6421	159286.7
2.6975	516.4290	160251.8
2.7000	518.2205	161222.0
2.7025	520.0167	162197.2
2.7050	521.8177	163177.5

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_3	θ_5
2.7075	523.6234	164163.0
2.7100	525.4338	165153.5
2.7125	527.2490	166149.2
2.7150	529.0690	167150.1
2.7175	530.8937	168156.1
2.7200	532.7232	169167.4
2.7225	534.5575	170183.9
2.7250	536.3965	171205.7
2.7275	538.2404	172232.7
2.7300	540.0891	173265.0
2.7325	541.9426	174302.7
2.7350	543.8009	175345.7
2.7375	545.6640	176394.1
2.7400	547.5320	177447.9
2.7425	549.4049	178507.1
2.7450	551.2826	179571.8
2.7475	553.1651	180641.9
2.7500	555.0526	181717.5
2.7525	556.9449	182798.6
2.7550	558.8421	183885.3
2.7575	560.7442	184977.5
2.7600	562.6513	186075.3
2.7625	564.5632	187178.7
2.7650	566.4801	188287.7
2.7675	568.4019	189402.4
2.7700	570.3286	190522.8
2.7725	572.2603	191648.8
2.7750	574.1970	192780.6
2.7775	576.1386	193918.2
2.7800	578.0852	195061.5
2.7825	580.0367	196210.6
2.7850	581.9933	197365.6
2.7875	583.9549	198526.4
2.7900	585.9215	199693.1
2.7925	587.8931	200865.7
2.7950	589.8697	202044.2
2.7975	591.8514	203228.6
2.8000	593.8381	204419.0
2.8025	595.8299	205615.5
2.8050	597.8267	206817.9
2.8075	599.8286	208026.4
2.8100	601.8355	209241.0
2.8125	603.8476	210461.6
2.8150	605.8647	211688.4
2.8175	607.8870	212921.4
2.8200	609.9144	214160.5
2.8225	611.9469	215405.8
2.8250	613.9845	216657.4
2.8275	616.0272	217915.2

Table 3 (Continued)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_3	θ_5
2.8300	618.0751	219179.3
2.8325	620.1282	220449.7
2.8350	622.1864	221726.5
2.8375	624.2498	223009.6
2.8400	626.3184	224299.1
2.8425	628.3922	225594.9
2.8450	630.4711	226897.3
2.8475	632.5553	228206.1
2.8500	634.6447	229521.4
2.8525	636.7393	230843.2
2.8550	638.8392	232171.6
2.8575	640.9443	233506.5
2.8600	643.0546	234848.0
2.8625	645.1702	236196.2
2.8650	647.2911	237551.0
2.8675	649.4172	238912.5
2.8700	651.5486	240280.7
2.8725	653.6854	241655.6
2.8750	655.8274	243037.4
2.8775	657.9747	244425.9
2.8800	660.1274	245821.2
2.8825	662.2854	247223.4
2.8850	664.4487	248632.4
2.8875	666.6173	250048.4
2.8900	668.7914	251471.2
2.8925	670.9708	252901.1
2.8950	673.1555	254337.9
2.8975	675.3457	255781.8
2.9000	677.5412	257232.7
2.9025	679.7421	258690.7
2.9050	681.9485	260155.7
2.9075	684.1602	261628.0
2.9100	686.3774	263107.3
2.9125	688.6000	264593.9
2.9150	690.8281	266087.7
2.9175	693.0616	267585.7
2.9200	695.3006	269097.0
2.9225	697.5450	270612.6
2.9250	699.7949	272135.6
2.9275	702.0503	273665.9
2.9300	704.3112	275203.6
2.9325	706.[illegible]	276748.8
2.9350	708.8496	278301.4
2.9375	711.1270	279861.5
2.9400	713.4100	281429.1
2.9425	715.6985	283004.2
2.9450	717.9926	284587.0
2.9475	720.2922	286177.3
2.9500	722.5974	287775.3

Table 3 (Continued)

(e) $-0.2000 \leq \xi \leq 3.1250$

ξ	θ_3	θ_5
2.9525	724.9082	289380.9
2.9550	727.2245	290954.2
2.9575	729.5465	292615.3
2.9600	731.8740	294244.1
2.9625	734.2072	295880.7
2.9650	736.5460	297525.2
2.9675	738.8904	299177.4
2.9700	741.2405	300837.0
2.9725	743.5962	302505.7
2.9750	745.9575	304181.8
2.9775	748.3245	305865.8
2.9800	750.6973	307557.8
2.9825	753.0756	309257.9
2.9850	755.4597	310966.0
2.9875	757.8495	312682.2
2.9900	760.2450	314406.6
2.9925	762.6462	316139.2
2.9950	765.0531	317879.9
2.9975	767.4658	319628.9
3.0000	769.8842	321386.2
3.0025	772.3084	323151.7
3.0050	774.7384	324925.6
3.0075	777.1741	326707.9
3.0100	779.6156	328498.5
3.0125	782.0629	330297.6
3.0150	784.5160	332105.1
3.0175	786.9749	333921.2
3.0200	789.4396	335745.7
3.0225	791.9102	337578.8
3.0250	794.3866	339420.6
3.0275	796.8688	341270.9
3.0300	799.3569	343129.9
3.0325	801.8509	344997.7
3.0350	804.3507	346874.1
3.0375	806.8565	348759.3
3.0400	809.3681	350653.3
3.0425	811.8856	352556.2
3.0450	814.4090	354467.9
3.0475	816.9384	356388.5
3.0500	819.4737	358318.0
3.0525	822.0149	360256.6
3.0550	324.5621	362204.1
3.0575	827.1152	364160.6
3.0600	829.6743	366126.3
3.0625	832.2394	368101.0
3.0630	834.8104	370084.9
3.0675	837.3875	372078.0
3.0700	839.9705	374080.3
3.0725	842.5596	376091.9

Table 3 (Concluded)

(e) $-0.2000 \leqslant \xi \leqslant 3.1250$

ξ	θ_3	θ_5
3.0750	845.1547	378112.7
3.0775	847.7558	380142.9
3.0800	850.3629	382182.4
3.0825	852.9761	384231.3
3.0850	855.5954	386289.6
3.0875	858.2207	388357.4
3.0900	860.8521	390434.7
3.0925	863.4896	392521.6
3.0950	866.1332	394618.0
3.0975	868.7829	396724.1
3.1000	871.4388	398839.7
3.1025	874.1007	400965.1
3.1050	876.7688	403100.2
3.1075	879.4430	405245.0
3.1100	882.1233	407399.7
3.1125	884.8099	409564.2
3.1150	887.5026	411738.5
3.1175	890.2015	413922.8
3.1200	892.9065	416117.0
3.1225	895.6178	418321.2
3 1250	898.3353	444444.4

Table 4

Coefficients in Series Expansion for Design Characteristic Slope

$0.2550 \leq \xi \leq 3.1250$

ξ	F	G		H
.2550-	1.1368771	6.0271106	-	6.199618
.2575-	1.1289901	5.9796595	-	5.892786
.2600-	1.1212015	5.9333576	-	5.594025
.2625-	1.1135089	5.8831681	-	5.302965
.2650-	1.1059102	5.8440558	-	5.019313
.2675-	1.0984033	5.8009864	-	4.742702
.2700-	1.0909863	5.7589276	-	4.472850
.2725-	1.0836570	5.7178479	-	4.209479
.2750-	1.0764137	5.6777177	-	3.952305
.2775-	1.0692545	5.6385080	-	3.701058
.2800-	1.0621776	5.6001911	-	3.455518
.2825-	1.0551813	5.5627403	-	3.215406
.2850-	1.0482640	5.5261304	-	2.980543
.2875-	1.0414239	5.4903362	-	2.750672
.2900-	1.0346596	5.4553348	-	2.525645
.2925-	1.0279695	5.4211028	-	2.305155
.2950-	1.0213522	5.3876184	-	2.089155
.2975-	1.0148062	5.3548606	-	1.877334
.3000-	1.0083301	5.3228092	-	1.669644
.3025-	1.0019225	5.2914441	-	1.465752
.3050-	.99558235	5.2607468	-	1.265735
.3075-	.98930811	5.2306989	-	1.069292
.3100-	.98309860	5.2012828	-	.876250
.3125-	.97695267	5.1724814	-	.686559
.3150-	.97086913	5.1442787	-	.500053
.3175-	.96484684	5.1166585	-	.316599
.3200-	.95888475	5.0895059	-	.136095
.3225-	.95298169	5.0631055		.041597
.3250-	.94713671	5.0371439		.216576
.3275-	.94134874	5.0117065		.388932
.3300-	.93561681	4.9867806		.558833
.3325-	.92993994	4.9623527		.726285
.3350-	.92431722	4.9384108		.891485
.3375-	.91874774	4.9149428		1.054441
.3400-	.91323060	4.8919370		1.215243
.3425-	.90776492	4.8693817		1.374065
.3450-	.90234989	4.8472666		1.530669
.3475-	.89698465	4.8255805		1.685891
.3500-	.89166842	4.8043133		1.838993
.3525-	.88640023	4.78345[illegible]		1.990404
.3550-	.88118010	4.7629977		2.140152
.3575-	.87600648	4.7429300		2.288312
.3600-	.87087786	4.7232377		2.434923
.3625-	.86579533	4.7039222		2.580101
.3650-	.86075739	4.6849702		2.723834
.3675-	.85576344	4.6663738		2.866271
.3700-	.85081289	4.6481254		3.007390
.3725-	.84590514	4.6302174		3.14728[illegible]

Table 4 (Continued)

$0.2550 \leq \xi \leq 3.1250$

ξ	F	G	H
.3750-	.84103682	4.6126382	3.285999
.3775-	.83621418	4.5953852	3.423577
.3800-	.83142989	4.5784471	3.560025
.3825-	.82668519	4.5618217	3.695532
.3850-	.82198257	4.5455025	3.830010
.3875-	.81731697	4.5294746	3.963552
.3900-	.81269119	4.5137447	4.096196
.3925-	.80810247	4.4932941	4.227973
.3950-	.80355109	4.4831213	4.358943
.3975-	.79903732	4.4682250	4.489185
.4000-	.79455924	4.4535912	4.618573
.4025-	.79011785	4.4392230	4.747367
.4050-	.78571200	4.4251111	4.875464
.4075-	.78134053	4.4112464	5.002931
.4100-	.77700375	4.3976280	5.129781
.4125-	.77270125	4.3842512	5.256117
.4150-	.76843262	4.3711113	5.381866
.4175-	.76419745	4.3582038	5.507196
.4200-	.75999467	4.3455203	5.632033
.4225-	.75582459	4.3330606	5.756403
.4250-	.75168617	4.3208164	5.880382
.4275-	.74757904	4.3087838	6.003973
.4300-	.74350417	4.2969664	6.127215
.4325-	.73945923	4.2853489	6.250129
.4350-	.73544519	4.2739352	6.372734
.4375-	.73146106	4.2627178	6.495048
.4400-	.72750715	4.2516967	6.617154
.4425-	.72358187	4.2408612	6.739006
.4450-	.71968616	4.2302151	6.860686
.4475-	.71581907	4.2197515	6.982115
.4500-	.71198030	4.2094671	7.103421
.4525-	.70816956	4.1993587	7.224587
.4550-	.70438654	4.1894232	7.345633
.4575-	.70063096	4.1796576	7.466582
.4600-	.69690252	4.1700590	7.587445
.4625-	.69320095	4.1606244	7.708263
.4650-	.68952597	4.1513510	7.829038
.4675-	.68587730	4.1422361	7.949794
.4700-	.68225411	4.1332734	8.070564
.4725-	.67865672	4.1244639	8.19129[illegible]
.4750-	.67508484	4.1158050	8.312107
.4775-	.67153825	4.10729[illegible]1	8.432965
.4800-	.66801612	4.098925[illegible]	8.553881
.4825-	.66451877	4.0906997	8.674879
.4850-	.66104595	4.0826147	8.795981
.4875-	.65759690	4.0746653	8.917199
.4900-	.65417189	4.0668519	9.038547
.4925-	.65077019	4.0591693	9.160037
.4950-	.64739157	4.0516153	9.28168[illegible]
.4975-	.64403634	4.0441911	9.40350[illegible]

Table 4 (Continued)

$0.2550 \leq \xi \leq 3.1250$

ξ	F	G	H
.5000-	.64070426	4.0368945	9.525530
.5025-	.63739460	4.0297705	9.647750
.5050-	.63410717	4.0226669	9.770183
.5075-	.63084225	4.0157351	9.892850
.5100-	.62759913	4.0089200	10.01576
.5125-	.62437762	4.0022196	10.13892
.5150-	.62117753	3.9956325	10.26235
.5175-	.61799914	3.9891598	10.38611
.5200-	.61484178	3.9827965	10.51008
.5225-	.61170525	3.9765412	10.63440
.5250-	.60858984	3.9703951	10.75904
.5275-	.60549442	3.9643505	10.88400
.5300-	.60241975	3.9584119	11.00931
.5325-	.59936473	3.9525717	11.13496
.5350-	.59633010	3.9468344	11.26098
.5375-	.59331522	3.9411955	11.38733
.5400-	.59031992	3.9356535	11.51416
.5425-	.58734404	3.9302070	11.64133
.5450-	.58438740	3.9248544	11.76891
.5475-	.58144941	3.9195916	11.89692
.5500-	.57853078	3.9144231	12.02535
.5525-	.57563091	3.9093445	12.15421
.5550-	.57274921	3.9043517	12.28355
.5575-	.56988639	3.8994491	12.41330
.5600-	.56704144	3.8946298	12.54352
.5625-	.56421463	3.8898954	12.67424
.5650-	.5614058[illegible]	3.8852446	12.80544
.5675-	.55861465	3.8806763	12.93709
.5700-	.55584157	3.8761894	13.06937
.5725-	.55308545	3.8717797	13.20204
.5750-	.55034714	3.8674520	13.33528
.5775-	.54762529	3.8631965	13.46903
.5800-	.54492098	3.8590207	13.60334
.5825-	.54223327	3.8549180	13.73819
.5850-	.53956242	3.8508899	13.87360
.5875-	.53690829	3.8469756	14.00958
.5900-	.53427076	3.8430541	14.14613
.5925-	.53164930	3.8392415	14.28327
.5950-	.52904380	3.8354969	14.42098
.5975-	.52645451	3.8318221	14.55930
.6000-	.52388129	3.8282162	14.69823
.6025-	52132403	3.8246783	14.83781
.6050-	.51878223	3.82170[illegible]	14.97798
.6075-	.51625578	3.8177946	15.11872
.6100-	.51374492	3.8144498	15.26017
.6125-	.51124953	3.8111694	15.40225
.6150-	.50876913	3.8079499	15.54499
.6175-	.5 630362	3.8047906	15.68837
.6200-	.50385324	3.8016931	15.83244
.6225-	.50141786	3.7986569	15.97719

Table 4 (Continued)

$0.2550 \leqslant \xi \leqslant 3.1250$

ξ	F	G	H
.6250-	.49899702	3.7956783	16.12261
.6275-	.49659063	3.7927568	16.26869
.6300-	.49419892	3.7898941	16.41554
.6325-	.49162143	3.7870868	16.56305
.6350-	.48945639	3.7843359	16.71129
.6375-	.48710938	3.7816410	16.86025
.6400-	.48477428	3.7789985	17.00992
.6425-	.48245332	3.7764112	17.16034
.6450-	.48014608	3.7738758	17.31149
.6475-	.47785245	3.7713918	17.46338
.6500-	.47557265	3.7689609	17.61608
.6525-	.47330627	3.7665801	17.76946
.6550-	.47105321	3.7642486	17.92365
.6575-	.46881370	3.7619684	18.07861
.6600-	.46658730	3.7597362	18.23436
.6625-	.46437395	3.7575516	18.39091
.6650-	.46217354	3.7554139	18.54821
.6675-	.45998629	3.7533251	18.70634
.6700-	.45781179	3.7512820	18.86524
.6725-	.45564997	3.7492841	19.02507
.6750-	.45350073	3.7473308	19.18560
.6775-	.45136428	3.7454241	19.34701
.6800-	.44923994	3.7435585	19.50924
.6825-	.44712822	3.7417383	19.67232
.6850-	.44502872	3.7399606	19.83625
.6875-	.44294138	3.7382249	20.00102
.6900-	.44086639	3.7365331	20.16667
.6925-	.43880310	3.7348798	20.33316
.6950-	.43675199	3.7332694	20.50055
.6975-	.43471241	3.7316965	20.66880
.7000-	.43268485	3.7301656	20.83794
.7025-	.43066895	3.7286738	21.00798
.7050-	.42866462	3.7272204	21.17891
.7075-	.42667179	3.7258052	21.35074
.7100-	.42469039	3.7244277	21.52348
.7125-	.42272033	3.7230874	21.69714
.7150-	.42076153	3.7217839	21.87172
.7175-	.41881393	3.7205158	22.04726
.7200-	.41687770	3.7192879	22.22367
.7225-	.41495226	3.7180923	22.40106
.7250-	.41303778	3.7169317	22.57937
.7275-	.41113420	3.7158059	22.75866
.7300-	.40924169	3.7147167	22.93892
.7325-	.40735968	3.7136590	23.12011
.7350-	.40548625	3.7126350	23.30229
.7375-	.40362753	3.7116440	23.48544
.7400-	.40177745	3.7106659	23.66957
.7425-	.39993773	3.7097601	23.85459
.7450-	.39810842	3.7088664	24.04080
.7475-	.39628944	3.7080044	24.22738

Table 4 (Continued)

$0.2550 \leq \xi \leq 3.1250$

ξ	F	G	H
.7500-	.39448072	3.7071737	24.41603
.7525-	.39268219	3.7063739	24.60517
.7550-	.39089380	3.7056048	24.79528
.7575-	.38911524	3.7048638	24.98649
.7600-	.38734691	3.7041549	25.17870
.7625-	.38558827	3.7034734	25.37192
.7650-	.38383951	3.7028212	25.56617
.7675-	.38210056	3.7021980	25.76153
.7700-	.38037135	3.7016038	25.95795
.7725-	.37865182	3.7010373	26.15534
.7750-	.37694167	3.7004970	26.35386
.7775-	.37524132	3.6999866	26.55340
.7800-	.37355023	3.6995014	26.75404
.7825-	.37186857	3.6990434	26.95576
.7850-	.37019630	3.6986122	27.15854
.7875-	.36853333	3.6982077	27.36248
.7900-	.36687940	3.6978271	27.56747
.7925-	.36523488	3.6974719	27.77358
.7950-	.36359929	3.6971461	27.98080
.7975-	.36197277	3.6968428	28.18913
.8000-	.36035507	3.6965626	28.39853
.8025-	.35874654	3.6963094	28.60916
.8050-	.35714671	3.6960788	28.82087
.8075-	.35555573	3.6958725	29.03371
.8100-	.35397355	3.6956883	29.24770
.8125-	.35239970	3.6955279	29.46283
.8150-	.35083474	3.6953913	29.67911
.8175-	.34927842	3.6952780	29.89658
.8200-	.34773068	3.6951880	30.11525
.8225-	.34619125	3.6951187	30.33500
.8250-	.34466031	3.6950721	30.55596
.8275-	.34313758	3.6950459	30.77812
.8300-	.34162322	3.6950420	31.00146
.8325-	.34011717	3.6950601	31.22600
.8350-	.33861939	3.6950999	31.45175
.8375-	.33712963	3.6951593	31.67869
.8400-	.33564803	3.6952400	31.90688
.8425-	.33417435	3.6953398	32.13621
.8450-	.33270852	3.6954626	32.36681
.8475-	.33125112	[illegible]	[illegible]
.8500-	.32980147	3.6957639	32.83166
.8525-	.32835956	3.6959441	33.06598
.8550-	.32692532	3.6961427	33.30151
.8575-	.32549908	3.6963626	33.53832
.8600-	.32408042	3.6966005	33.77637
.8625-	.32266931	3.6968559	34.01567
.8650-	.32126587	3.6971307	34.25625
.8675-	.31987006	3.6974246	34.49811
.8700-	.31848165	3.6977354	34.74123
.8725-	.31710077	3.6980651	34.98[illegible]65

Table 4 (Continued)

$0.2550 \leq \xi \leq 3.1250$

ξ	F	G	H
.8750-	.31572721	3.6984112	35.22134
.8775-	.31436109	3.6987758	35.47838
.8800-	.31300219	3.6991567	35.72664
.8825-	.31165065	3.6995556	35.97624
.8850-	.31030624	3.6999704	36.22715
.8875-	.30896910	3.7004030	36.47938
.8900-	.30763918	3.7008532	36.73295
.8925-	.30631627	3.7013187	36.98783
.8950-	.30500049	3.7018014	37.24406
.8975-	.30369164	3.7022993	37.50162
.9000-	.30238967	3.7028120	37.76052
.9025-	.30109470	3.7033416	38.02081
.9050-	.29980670	3.7038877	38.28239
.9075-	.29852545	3.7044483	38.54538
.9100-	.29725093	3.7050232	38.80971
.9125-	.29598324	3.7056143	39.07543
.9150-	.29472235	3.7062214	39.34254
.9175-	.29346791	3.7068404	39.61100
.9200-	.29222033	3.7074771	39.88089
.9225-	.29097928	3.7081274	40.15216
.9250-	.28974471	3.7087911	40.42483
.9275-	.28851658	3.7094681	40.69889
.9300-	.28729501	3.7101603	40.97438
.9325-	.28607996	3.7108673	41.25125
.9350-	.28487124	3.7115878	41.52964
.9375-	.28366881	3.7123208	41.80939
.9400-	.28247278	3.7130683	42.09060
.9425-	.28128297	3.7138285	42.37323
.9450-	.28009934	3.7146010	42.65730
.9475-	.27892200	3.7153878	42.94284
.9500-	.27775077	3.7161868	43.22983
.9525-	.27658576	3.7169998	43.51830
.9550-	.27542678	3.7178246	43.80822
.9575-	.27427380	3.7186613	44.09961
.9600-	.27312693	3.7195117	44.39250
9625-	.27198598	3.7203736	44.68683
.9650-	.27085094	3.7212159	44.95271
.9675-	.26972189	3.7221336	45.28003
.9700-	.26859867	3.7230216	45.57893
.9725-	.26748123	3.7239405	45.87928
.9750-	.26636970	3.7248626	46.18116
.9775-	.26526389	3.7257955	45.48456
.9800-	.26416377	3.7267392	46.78948
.9825-	.26306944	3.727695[illegible]	47.09590
.9850-	.26198073	3.7286626	47.40392
.9875-	.26089762	3.7295400	47.71345
.9900-	.25982020	3.7306298	48.02454
.9925-	.25874817	3.7316280	48.33715
.9950-	.25768176	3.7326383	48.65134
.9975-	.25662095	3.7336606	48.96714

Table 4 (Continued)

$0.2550 \leq \xi \leq 3.1250$

ξ	F	G	H
.0000-	.25556544	3.7346910	49.28442
1.0025-	.25451546	3.7357332	49.60328
1.0050-	.25347085	3.7367852	49.92380
1.0075-	.25243170	3.7378489	50.24588
1.0100-	.25139772	3.7389203	50.56957
1.0125-	.25036915	3.7400032	50.89479
1.0150-	.24934582	3.7410955	51.22165
1.0175-	.24832770	3.7421971	51.55012
1.0200-	.24731490	3.7433100	51.88022
1.0225-	.24630724	3.7444320	52.21103
1.0250-	.24530459	3.7455613	52.54525
1.0275-	.24430727	3.7467033	52.88024
1.0300-	.24331490	3.7478524	53.21687
1.0325-	.24232756	3.7490104	53.55507
1.0350-	.24134535	3.7501790	53.89498
1.0375-	.24036811	3.7513563	54.23653
1.0400-	.23939583	3.7525422	54.57975
1.0425-	.23842847	3.7537366	54.92462
1.0450-	.23746611	3.7549414	55.27119
1.0475-	.23650851	3.7561527	55.61941
1.0500-	.23555585	3.7573741	55.96930
1.0525-	.23460801	3.7586038	56.32094
1.0550-	.23366494	3.7598416	56.67420
1.0575-	.23272663	3.7610875	57.02924
1.0600-	.23179304	3.7623414	57.38589
1.0625-	.23086427	3.7636051	57.74437
1.0650-	.22994006	3.7648748	58.10450
1.0675-	.22902061	3.7661542	58.46636
1.0700-	.22810577	3.7674412	58.82996
1.0725-	.22719553	3.7687360	59.19529
1.0750-	.22628985	3.7700383	59.56236
1.0775-	.22538872	3.7713481	59.93116
1.0800-	.22449210	3.7726654	60.30173
1.0825-	.22359997	3.7739901	60.67404
1.0850-	.22271230	3.7753221	61.04812
1.0875-	.22182918	3.7766631	61.42400
1.0900-	.22095037	3.7780096	61.80162
1.0925-	.22007605	3.7793650	62.18104
1.0950-	.21920598	3.7807256	62.56222
1.0975-	.21834037	3.7820951	62.94522
1.1000-	.21747906	3.7334715	63.33003
1.1025-	.21662205	3.7848548	63.71663
1.1050-	.21576919	3.7862471	64.10501
1.1075-	.21492069	3.787640[illegible]	64.49523
1.1100-	.21407639	3.7890435	64.88728
1.1125-	.21323530	3.7904539	65.28116
1.1150-	.21240037	3.7918706	65.67686
1.1175-	.21156859	3.7932940	66.07441
1.1200-	.21074093	3.7947238	66.47380
1.1225-	.20991737	3.7961601	66.87503

Table 4 (Continued)

$0.2550 \leq \xi \leq 3.1250$

ξ	F	G	H
1.1250-	.20909789	3.7976028	[illegible].27813
1.1275-	.20828246	3.7990518	67.64305
1.1300-	.20747106	3.8005070	68.08996
1.1325-	.20665358	3.8019665	68.49858
1.1350-	.20586018	3.8034348	68.90919
1.1375-	.20506074	3.8049080	69.32163
1.1400-	.20426524	3.8063877	69.73599
1.1425-	.20347366	3.8078735	70.15225
1.1450-	.20268598	3.8093652	70.57041
1.1475-	.20190208	3.8108611	70.99045
1.1500-	.20112213	3.8123646	71.41248
1.1525-	.20034591	3.8138721	71.83632
1.1550-	.19957360	3.8153872	72.26216
1.1575-	.19880508	3.8169080	72.68993
1.1600-	.19804024	3.8184326	73.11962
1.1625-	.19727915	3.8199629	73.55124
1.1650-	.19652178	3.8214988	73.98482
1.1675-	.19576820	3.8230420	74.42039
1.1700-	.19501823	3.8245889	74.85790
1.1725-	.19427192	3.8261412	75.29737
1.1750-	.19352925	3.8276989	75.73886
1.1775-	.19279011	3.8292603	76.18222
1.1800-	.19205468	3.8308287	76.62764
1.1825-	.19132273	3.8324006	77.07502
1.1850-	.19059444	3.8339795	77.52444
1.1875-	.18986961	3.8355618	77.97583
1.1900-	.18914830	3.8371493	78.42924
1.1925-	.18843049	3.8387419	78.88469
1.1950-	.18771618	3.8403395	79.34210
1.1975-	.18700533	3.8419422	79.80162
1.2000-	.18629792	3.8435499	80.26314
1.2025-	.18559386	3.8451607	80.72632
1.2050-	.18489321	3.8467765	81.19219
1.2075-	.18419596	3.8483971	81.65[illegible]83
1.2100-	.18350207	3.8500226	82.1[illegible]52
1.2125-	.18281154	3.8516529	82.60128
1.2150-	.18212434	3.8532879	83.07512
1.2175-	.18144038	3.8549259	83.55103
1.2200-	.18075972	3.8565686	84.02896
1.2225-	.18008233	3.8532160	84.50901
1.2250-	.17940821	3.8598680	84.99117
1.2275-	.17873734	3.8615245	85.47543
1.2300-	.17806961	3.8631839	85.96177
1.2325-	.17740517	3.8648445	86.45025
1.2350-	.17674[illegible]84	3.8665179	86.94083
1.2375-	.17608561	3.8681690	87.43354
1.2400-	.17543062	3.8698[illegible]	87.92838
1.2425-	.17477868	3.871546[illegible]	88.42526
1.2450-	.17412987	3.87322[illegible]	88.92438
1.2475-	.17348416	3.87[illegible]9188	89.42563

Table 4 (Continued)

$0.2550 \leq \xi \leq 3.1250$

ξ	F	G	
1.2500-	.17284155	3.87661[illegible]	[illegible]
1.2525-	.17220192	3.8783[illegible]1	[illegible]
1.2550-	.17156536	3.880[illegible]	[illegible]3
1.2575-	.17093[illegible]83	3.881[illegible]	.9[illegible]9
1.2600-	.170301[illegible]	3.8834[illegible]	[illegible]
1.2625-	.1696737[illegible]	3.885[illegible]	[illegible]
1.2650-	.169049[illegible]5	3.88[illegible]	[illegible]
1.2675-	.16842754	3.8[illegible]617	2.[illegible]
1.2700-	.167608[illegible]	3.8[illegible]2826	3[illegible]
1.2725-	.1671930[illegible]	3.89200[illegible]	[illegible]
1.2750-	.16658015	3.[illegible]37[illegible]6[illegible]	[illegible]
1.2775-	.16597019	3.[illegible]469[illegible]	[illegible]
1.2800-	.16536305	3.[illegible]	[illegible]
1.2825-	.16475879	3.[illegible]	6.[illegible]3
1.2850-	.164157[illegible]40	3.90[illegible]	[illegible]53
1.2875-	.16355377	3.90[illegible]	[illegible]79
1.2900-	.16296298	3.9[illegible]	[illegible]15
1.2925-	.162[illegible]7001	3.[illegible]	[illegible]79
1.2950-	.16177976	3.[illegible]	98[illegible]6[illegible]
1.2975-	.16119230	3.[illegible]094[illegible]	99[illegible]30
1.3000-	.16060761	3.91[illegible]	99[illegible]21
1.3025-	.1600256[illegible]	3.91[illegible]	10[illegible]
1.3050-	.15944635	3.9[illegible]3	10[illegible]075
1.3075-	.15[illegible]3695[illegible]	3.9[illegible]11	[illegible]5[illegible]0
1.3100-	.15829592	3.9[illegible]84	[illegible]4[illegible]
1.3125-	.1577247[illegible]	3.92[illegible]6[illegible]	10[illegible].67[illegible]
1.3150-	.15715[illegible]21	3.92[illegible]3	10[illegible]
1.3175-	.15659030	3.9[illegible]7	[illegible]
1.3200-	.1560[illegible]	3.9[illegible]4[illegible]	104[illegible]7
1.3225-	.1[illegible]54[illegible]36	3.92[illegible]1[illegible]	10[illegible].[illegible]218
1.32[illegible]0-	.15400837	3.92[illegible]	10[illegible].4502
1.3275-	.154[illegible]285	3.93[illegible]	106[illegible]0510
1.3300-	.15[illegible]80000	3.93[illegible]	[illegible]06.[illegible]40
1.3325-	.15324967	3.93[illegible]	[illegible]7.209
1.3350-	.152[illegible]0184	3.93[illegible]6	10[illegible]
1.3375-	.1[illegible]215657	3.9[illegible]42	108.[illegible]
1.3400-	.1[illegible]161384	3.9[illegible]92	10[illegible]
1.3425-	.151073[illegible]7	3.[illegible]75	10[illegible]
1.3450-	.[illegible]5053532	[illegible]375	110.[illegible]2[illegible]
1.3475-	.[illegible]000051	[illegible]205	[illegible]
1.3500-	.[illegible]4946769	[illegible]	[illegible]
1.3525-	.[illegible]4893735	[illegible]	[illegible]1.[illegible]
1.3550-	.14840[illegible]	[illegible]5[illegible]	11[illegible]
1.3575-	.14[illegible]8[illegible]	[illegible]08[illegible]	11[illegible]
1.3600-	[illegible]	[illegible]4[illegible]	113[illegible]5
1.3625-	.1[illegible]6[illegible]8	3[illegible]	11[illegible]5
1.3650-	.1462[illegible]	1[illegible]2	11[illegible]0
1.3675-	.145[illegible]	[illegible]01[illegible]	1[illegible]46
1.3700-	.14[illegible]2[illegible]	[illegible]35[illegible]	1[illegible]5.[illegible]52
1.3725-	.144[illegible]	[illegible]158[illegible]	1[illegible].[illegible]0[illegible]
		[illegible]3[illegible]	11[illegible].[illegible]62

Table 4 (Continued)

$0.2550 \leqslant \xi \leqslant 3.1250$

	F	G	H
1.3[illegible]-	14427200	3.9653709	117.9749
.3[illegible]	.14376539	3.9672158	118.5960
1.38[illegible]-	.14326112	3.9690629	119.2196
1[illegible]	.14275911	3.9709118	1[illegible].5[illegible]56
[illegible]-	.14225935	3.9727621	[illegible].4741
1.3875-	.14176189	3.9746153	12[illegible].1052
1.3900-	.14126672	3.9764715	121.7387
1.3925-	.14077376	3.97[illegible]3287	122.3747
1.3950-	.14028307	3.9801893	123.0133
1.3975-	.13979457	3.9820510	123.6543
1.4000-	.13930825	3.9839140	124.2978
1.4025-	.13882415	3.9857798	124.9439
1.4050-	.13834228	3.9876485	125.5926
1.4075-	.13786255	3.9895183	126.2437
1.4100-	.13738495	3.9913894	126.8974
1.4125-	.13690954	3.9932633	127.5536
1.4150-	.13643629	3.9951400	128.2124
1.4175-	.13596509	3.9970162	128.8738
1.4200-	.13549610	3.9988969	129.5377
1.4225-	.13502912	4.0007770	130.2041
1.4250-	.13456433	4.0026614	130.8733
1.4275-	.13410154	4.0045454	131.5449
1.4300-	.13364086	4.0064320	132.2191
1.4325-	.13318226	4.0083214	132.8960
1.4350-	.13272570	4.0102118	133.5754
1.4375-	.13227114	4.0121033	134.2575
1.4400-	.13181865	4.0139974	134.9422
1.4425-	.13136815	4.0158925	135.6294
1.4450-	.13091969	4.0177902	136.3194
1.4475-	.13047321	4.0196890	137.0120
1.4500-	.13002869	4.0215887	137.7071
1.4525-	.12958617	4.0234910	138.4050
1.4550-	.12914560	4.0253943	139.1055
1.4575-	.12870696	4.0272985	139.8086
1.4600-	.12827030	4.0292053	140.5145
1.4625-	.12783560	4.0311146	141.2230
1.4650-	.12740276	4.0330232	141.9341
1.4675-	.12697186	4.0349343	142.6480
1.4700-	.12654289	4.0368479	143.3646
1.4725-	.12611580	4.0387624	144.0839
1.4750-	.12569058	4.0406777	144.8058
1.4775-	.12526720	4.0425939	145.5303
1.4800-	.12484573	4.0445129	146.2379
1.4825-	.12442614	4.0464337	146.9880
1.4850-	.12400833	4.0483540	147.7208
1.4875-	.12359228	4.0502767	148.4564
1.4900-	.12317824	4.0522003	149.1947
1.4925-	.12276595	4.0541262	149.9358
1.4950-	.12235545	4.0560530	150.6796
1.4975-	.12194673	4.0579804	151.4262

Table 4 (Continued)

$0.2550 \leqslant \xi \leqslant 3.1250$

ξ	F	G	H
1.5000-	.12153983	4.0599103	152.1756
1.5025-	.12112164	4.06183[illegible]	152.9277
1.5050-	.12073130	4.0637723	153.6827
1.5075-	.12032966	4.0657044	154.4403
1.5100-	.11992940	4.0676388	155.2008
1.5125-	.119[illegible]166	4.0695739	155.9641
1.5150-	11913543	4.0715098	156.7301
1.5175-	.11874058	4.0734479	157.4991
1.5200-	.11834762	4.0753867	158.2706
1.5225-	.11795635	4.0773262	159.0453
1.5250-	.11756681	4.0792680	159.8227
1.5275-	.11717895	4.0812105	160.6029
1.5300-	.11679274	4.0831535	161.3860
1.5325-	.11640820	4.0850973	162.1719
1.5350-	.11602535	4.0870433	162.9607
1.5375-	.11564414	4.0889899	163.7523
1.5400-	.11526456	4.0909371	164.5468
1.5425-	.11488661	4.0928849	165.3441
1.5450-	.11451031	4.0948350	166.1444
1.5475-	.11413562	4.0967856	166.9476
1.5500-	.11376254	4.0987369	167.7536
1.5525-	.11339104	4.1006887	168.5625
1.5550-	.11302117	4.1026427	169.3744
1.5575-	.11265288	4.1045973	170.1891
1.5600-	.11228615	4.1065524	171.0068
1.5625-	.11192098	4.1085081	171.8274
1.5650-	.11155741	4.1104659	172.6510
1.5675-	.11119538	4.1124242	173.4775
1.5700-	.11033488	4.1143331	174.3069
1.5725-	.11047592	4.1163426	175.1393
1.5750-	.11011847	4.1183025	175.9746
1.5775-	.10976258	4.1202645	176.8129
1.5800-	.10940815	4.1222255	177.6542
1.5825-	.10905527	4.1241886	178.4984
1.5850-	.10870387	4.1261521	179.3456
1.5875-	.10835400	4.1281177	180.1959
1.5900-	.10800556	4.1300822	181.0491
1.5925-	.10765863	4.1320488	181.9053
1.5950-	.10731316	4.1340159	182.7646
1.5975-	.10696914	4.1359834	183.6269
1.6000-	.10662658	4.1379514	184.4921
1.6025-	.10628545	4.139919[illegible]	185.3604
1.6050-	10594579	4.14189[illegible]	186.2318
1.6075-	.10560755	4.1438612	187.1062
1.6100-	.10527074	4.1458325	187.9837
1.6125-	.10493533	4.1478043	188.8642
1.6150-	.10 60133	4.1497765	189.7478
1.6175-	.10426872	4.1517491	190.6343
1.6200-	.10393751	4.1537222	191.5240
1.6225-	.10360771	4.1556972	192.4168

Table 4 (Continued)

$0.2550 \leq \xi \leq 3.1250$

ξ	F	G	H
1.6250-	.10327926	4.1576711	193.3126
1.6275-	.10295221	4.1596469	194.2116
1.6300-	.10262652	4.1616232	195.1137
1.6325-	.10230219	4.1635998	196.0188
1.6350-	.10197921	4.1655768	196.9271
1.6375-	.10165760	4.1675558	197.8386
1.6400-	.10133730	4.1695335	198.7531
1.6425-	.10101836	4.1715133	199.6708
1.6450-	.10070071	4.1734918	200.5916
1.6475-	.10038441	4.1754722	201.5155
1.6500-	.10006942	4.1774531	202.4427
1.6525-	.09975570	4.1794327	203.3729
1.6550-	.09944331	4.1814142	204.3064
1.6575-	.09913221	4.1833961	205.2429
1.6600-	.09882243	4.1853798	206.1828
1.6625-	.09851389	4.1873624	207.1257
1.6650-	.09820662	4.1893453	208.0719
1.6675-	.09790062	4.1913285	209.0212
1.6700-	.09759592	4.1933136	209.9738
1.6725-	.09729243	4.1952975	210.9296
1.6750-	.09699022	4.1972833	211.8886
1.6775-	.09668922	4.1992678	212.8508
1.6800-	.09638949	4.2012542	213.8162
1.6825-	.09609099	4.2032409	214.7850
1.6850-	.09579367	4.2052264	215.7568
1.6875-	.09549761	4.2072136	216.7320
1.6900-	.09520276	4.2092013	217.7105
1.6925-	.09490911	4.2111892	218.6922
1.6950-	.09461666	4.2131774	219.6772
1.6975-	.09432541	4.2151659	220.6655
1.7000-	.09403531	4.2171531	221.6570
1.7025-	.09374642	4.2191422	222.6518
1.7050-	.09345871	4.2211315	223.6499
1.7075-	.09317217	4.2231212	224.6514
1.7100-	.09288680	4.2251111	225.6561
1.7125-	.09260258	4.2271012	226.6641
1.7150-	.09231952	4.2290917	227.6755
1.7175-	.09203761	4.2310824	228.6902
1.7200-	.09175684	4.2330734	229.7083
1.7225-	.09147720	4.2350646	230.7297
1.7250-	.09119870	4.2370561	231.7544
1.7275-	.09092132	4.2390479	232.7825
1.7300-	.09064507	4.24103[illegible]	233.8140
1.7325-	.09036993	4.2430322	234.8488
1.7350-	.09009589	4.2450247	235.8870
1.7375-	.08982297	4.2470174	236.9286
1.7400-	.08955114	4.2490104	237.9736
1.7425-	.08928041	4.2510037	239.0220
1.7450-	.08901073	4.2529956	240.0737
1.7475-	.08874217	4.2549893	241.1290

Table 4 (Continued)

$0.2550 \leqslant \xi \leqslant 3.1250$

ξ	F	G	H
1.7500-	.08847469	4.2569833	242.1876
1.7525-	.08820828	4.2589775	243.2496
1.7550-	.08794290	4.2609704	244.3150
1.7575-	.08767863	4.2629650	245.3840
1.7600-	.08741537	4.2649584	246.4562
1.7625-	.08715321	4.2669535	247.5321
1.7650-	.08689206	4.2689473	248.6113
1.7675-	.08663195	4.2709413	249.6940
1.7700-	.08637291	4.2729370	250.7802
1.7725-	.08611487	4.2749315	251.8698
1.7750-	.08585786	4.2769262	252.9629
1.7775-	.08560188	4.2789210	254.0595
1.7800-	.08534691	4.2809162	255.1596
1.7825-	.08509296	4.2829115	256.2633
1.7850-	.08484002	4.2849070	257.3704
1.7875-	.08458805	4.2869012	258.4810
1.7900-	.08433711	4.2888971	259.5952
1.7925-	.08408713	4.2908917	260.7129
1.7950-	.08383817	4.2928881	261.8341
1.7975-	.08359017	4.2948831	262.9589
1.8000-	.08334315	4.2968783	264.0872
1.8025-	.08309711	4.2988737	265.2191
1.8050-	.08285204	4.3008693	266.3545
1.8075-	.08260793	4.3028651	267.4935
1.8100-	.08236479	4.3048611	268.6362
1.8125-	.08212258	4.3068558	269.7822
1.8150-	.08188135	4.3088522	270.9321
1.8175-	.08164103	4.3108473	272.0853
1.8200-	.08140167	4.3128425	273.2423
1.8225-	.08116324	4.3148380	274.4028
1.8250-	.08092575	4.3168337	275.5670
1.8275-	.08068919	4.3188296	276.7349
1.8300-	.08045356	4.3208257	277.9063
1.8325-	.08021882	4.3228204	279.0813
1.8350-	.07998503	4.3248168	280.2601
1.8375-	.07975212	4.3268118	281.4425
1.8400-	.07952013	4.3288070	282.6285
1.8425-	.07928904	4.3308024	283.8182
1.8450-	.07905882	4.3327964	285.0114
1.8475-	.07882953	4.3347922	286.2085
1.8500-	.07860110	4.3367865	287.4091
1.8525-	.07837360	4.3387807	288.6136
1.8550-	.07814694	4.3407775	289.8217
1.8575-	.07792117	4.3427724	291.0335
1.8600-	.07769625	4.3447661	292.2490
1.8625-	.07747223	4.3467614	293.4682
1.8650-	.07724905	4.3487556	294.6911
1.8675-	.07702673	4.3507497	295.9178
1.8700-	.07680528	4.3527440	297.1482
1.8725-	.07658468	4.3547386	298.3824

Table 4 (Continued)

$0.2550 \leqslant \xi \leqslant 3.1250$

ξ	F	G	H
1.8750-	.07636491	4.3567318	299.6203
1.8775-	.07614601	4.3587266	300.8620
1.8800-	.07592793	4.3607202	302.1074
1.8825-	.07571070	4.3627139	303.35[illegible]
1.8850-	.07549427	4.3647063	304.6096
1.8875-	.07527870	4.3667004	305.8664
1.8900-	.07506394	4.3686931	307.1269
1.8925-	.07485000	4.3706860	308.3912
1.8950-	.07463689	4.3726791	309.6594
1.8975-	.07442459	4.3746724	310.9314
1.9000-	.07421308	4.3766643	312.2072
1.9025-	.07400239	4.3786564	313.4868
1.9050-	.07379250	4.3806487	314.7702
1.9075-	.07358341	4.3826411	316.0576
1.9100-	.07337510	4.3846322	317.3486
1.9125-	.07316758	4.3866235	318.6436
1.9150-	.07296086	4.3886150	319.9425
1.9175-	.07275492	4.3906066	321.2452
1.9200-	.07254975	4.3925969	322.5517
1.9225-	.07234538	4.3945889	323.8623
1.9250-	.07214177	4.3965795	325.1766
1.9275-	.07193890	4.3985688	326.4948
1.9300-	.07173683	4.4005598	327.8170
1.9325-	.07153551	4.4025494	329.1430
1.9350-	.07133495	4.4045393	330.4730
1.9375-	.07113512	4.4065278	331.8068
1.9400-	.07093608	4.4085179	333.1448
1.9425-	.07073777	4.4105068	334.4865
1.9450-	.07054018	4.4124943	335.8321
1.9475-	.07034336	4.4144836	337.1817
1.9500-	.07014727	4.4164714	338.5353
1.9525-	.06995191	4.4134595	339.8929
1.9550-	.06975729	4.4204477	341.2544
1.9575-	.06956339	4.4224346	342.6199
1.9600-	.06937021	4.4244217	343.9894
1.9625-	.06917776	4.4264090	345.3623
1.9650-	.06898601	4.4283949	346.7403
1.9675-	.06879498	4.4303810	348.1217
1.9700-	.06860467	4.4323673	349.5072
1.9725-	.06841507	4.4343538	350.8967
1.9750-	.06822617	4.4363389	352.2903
1.9775-	.06803796	4.4383243	353.6878
1.9800-	.06785045	4.4403[illegible]	355.0893
1.9825-	.06766365	4.4422940	356.4950
1.9850-	.06747753	4.4442784	357.9047
1.9875-	.06729209	4.4462615	359.3184
1.9900-	.06710734	4.4482447	360.7361
1.9925-	.06692327	4.4502282	362.1580
1.9950-	.06673989	4.4522118	363.5840
1.9975-	.06655718	4.4541941	365.0140

Table 4 (Continued)

$0.2550 \leq \xi \leq 3.1250$

ξ	F	G	H
2.0000-	.06637514	4.4561766	366.4481
2.0025-	.06619378	4.4581593	367.8863
2.0050-	.06601308	4.4601407	369.3267
2.0075-	.06583304	4.4621223	370.7751
2.0100-	.06565365	4.4641025	372.2256
2.0125-	.06547495	4.4660845	373.6804
2.0150-	.06529687	4.4680636	375.1391
2.0175-	.06511946	4.4700445	376.6022
2.0200-	.06494270	4.4720240	378.0692
2.0225-	.06476658	4.4740037	379.5405
2.0250-	.06459110	4.4759822	381.0159
2.0275-	.06441626	4.4779608	382.4955
2.0300-	.06424207	4.4799396	383.9794
2.0325-	.06406850	4.4819171	385.4672
2.0350-	.06389557	4.4838949	386.9594
2.0375-	.06372325	4.4858713	388.4557
2.0400-	.06355157	4.4878479	389.9562
2.0425-	.06338052	4.4898248	391.4609
2.0450-	.06321008	4.4918003	392.9698
2.0475-	.06304026	4.4937761	394.4830
2.0500-	.06287106	4.4957520	396.0005
2.0525-	.06270247	4.4977267	397.5221
2.0550-	.06253449	4.4997016	399.0481
2.0575-	.06236711	4.5016752	400.5781
2.0600-	.06220034	4.5036490	402.1125
2.0625-	.06203417	4.5056230	403.6512
2.0650-	.06186860	4.5075957	405.1942
2.0675-	.06170363	4.5095687	406.7414
2.0700-	.06153924	4.5115403	408.2929
2.0725-	.06137545	4.5135122	409.8487
2.0750-	.06121223	4.5154828	411.4088
2.0775-	.06104963	4.5174551	412.9732
2.0800-	.06088758	4.5194247	414.5419
2.0825-	.06072612	4.5213945	416.1149
2.0850-	.06056524	4.5233644	417.6922
2.0875-	.06040495	4.5253347	419.2740
2.0900-	.06024522	4.5273036	420 8601
2.0925-	.06008605	4.5292713	422.4504
2.0950-	.05992746	4.5312392	424.0451
2.0975-	.05976943	4.5332073	425.64[illegible]3
2.1000-	.05961196	4.5351742	427.2478
2.1025-	.05945506	4.53714[illegible]3	428.8556
2.1050-	.05929871	4.5391072	430.4678
2.1075-	.05914292	4.5410732	432.0844
2.1100-	.05898767	4.5430381	433.7054
2.1125-	.05883298	4.5450031	435.3308
2.1150-	.05867885	4.5469684	436.9507
2.1175-	.0[illegible]852525	4.5489324	438.5950
2.1200-	.05837218	4.5508953	440.2336
2.1225-	.05821967	4.5528593	441.8767

Table 4 (Continued)

$0.2550 \leqslant \xi \leqslant 3.1250$

ξ	F	G	H
2.1250-	.05806770	4.5548216	443.5243
2.1275-	.05791626	4.5567836	445.1763
2.1300-	.05776536	4.5587459	446.8228
2.1325-	.05761498	4.5607070	448.4935
2.1350-	.05746514	4.5626682	450.1590
2.1375-	.05731382	4.5646283	451.6289
2.1400-	.05716703	4.5665886	453.5032
2.1425-	.05701875	4.5685477	455.1820
2.1450-	.05687101	4.5705070	456.8653
2.1475-	.05672377	4.5724651	458.5531
2.1500-	.05657705	4.5744234	460.2455
2.1525-	.05643084	4.5763806	461.9423
2.1550-	.05628515	4.5783380	463.6437
2.1575-	.05613996	4.5802941	465.3495
2.1600-	.05599528	4.5822505	467.0600
2.1625-	.05585110	4.5842058	468.7749
2.1650-	.05570743	4.5861612	470.4944
2.1675-	.05556427	4.5881170	472.2186
2.1700-	.05542159	4.5900700	473.9472
2.1725-	.05527942	4.5920248	475.6805
2.1750-	.05513772	4.5939769	477.4182
2.1775-	.05499654	4.5959307	479.1607
2.1800-	.05485582	4.5978819	480.9076
2.1825-	.05471562	4.5998348	482.6593
2.1850-	.05457588	4.6017851	484.4154
2.1875-	.05443663	4.6037356	486.1761
2.1900-	.05429787	4.6056864	487.9416
2.1925-	.05415958	4.6076360	489.7117
2.1950-	.05402177	4.6095859	491.4864
2.1975-	.05388444	4.6115345	493.2657
2.2000-	.05374756	4.6134821	495.0497
2.2025-	.05361117	4.6154299	496.8383
2.2050-	.05347526	4.6173779	498.6317
2.2075-	.05333980	4.6193248	500.4297
2.2100-	.05320481	4.6212705	502.2324
2.2125-	.05307028	4.6232165	504.0397
2.2150-	.05293621	4.6251613	505.8517
2.2175-	.05280261	4.6271064	507.6685
2.2200-	.05266945	4.6290504	509.4899
2.2225-	.05253675	4.6309931	511.3160
2.2250-	.05240450	4.6329362	513.1466
2.2275-	.05227272	4.6348796	514.9825
2.2300-	.05214138	4.6368218	516.8229
2.2325-	.05201048	4.63876[illegible]	518.6679
2.2350-	.05188003	4.6407041	520.5173
2.2375-	.05175003	4.6426443	522.3724
2.2400-	.05162045	4.6445834	524.2316
2.2425-	.05149133	4.6465227	526.0957
2.2450-	.05136265	4.6484623	527.9647
2.2475-	.05123440	4.6504008	529.8384

Table 4 (Continued)

$0.2550 \leqslant \xi \leqslant 3.1250$

ξ	F	G	H
2.2500-	.05110658	4.6523382	531.7169
2.2525-	.05097920	4.6542758	533.6002
2.2550-	.05085225	4.6562123	535.4803
2.2575-	.05072572	4.6581477	537.3811
2.2600-	.05059962	4.6600834	539.2788
2.2625-	.05047393	4.6620194	541.1814
2.2650-	.05034871	4.6639529	543.0887
2.2675-	.05022388	4.6658866	545.0009
2.2700-	.05009948	4.6678206	546.9180
2.2725-	.04997550	4.6697536	548.8400
2.2750-	.04985192	4.6716854	550.7667
2.2775-	.04972877	4.6736175	552.6984
2.2800-	.04960603	4.6755485	554.6349
2.2825-	.04948370	4.6774799	556.5764
2.2850-	.04936178	4.6794101	558.5228
2.2875-	.04924027	4.6813392	560.4739
2.2900-	.04911916	4.6832687	562.4301
2.2925-	.04899846	4.6851970	564.3911
2.2950-	.04887815	4.6871242	566.3570
2.2975-	.04875826	4.6890518	568.3279
2.3000-	.04863876	4.6909783	570.3036
2.3025-	.04851967	4.6929051	572.2845
2.3050-	.04840096	4.6948308	574.2701
2.3075-	.04828265	4.6967554	576.2608
2.3100-	.04816474	4.6986803	578.2565
2.3125-	.04804721	4.7006042	580.2570
2.3150-	.04793007	4.7025270	582.2626
2.3175-	.04781333	4.7044501	584.2731
2.3200-	.04769696	4.7063721	586.2887
2.3225-	.04758098	4.7082931	588.3091
2.3250-	.04746539	4.7102143	590.3347
2.3275-	.04735018	4.7121345	592.3652
2.3300-	.04723536	4.7140551	594.4009
2.3325-	.04712091	4.7159747	596.4415
2.3350-	.04700683	4.7178931	598.4871
2.3375-	.04689314	4.7198119	600.5379
2.3400-	.04677981	4.7217296	602.5936
2.3425-	.04666686	4.7236462	604.6544
2.3450-	.04655427	4.7255618	606.7201
2.3475-	.04644206	4.7274778	608.791[illegible]
2.3500-	.04633023	4.7293941	610.8672
2.3525-	.04621874	4.7313080	612.9482
2.3550-	.04610763	4.7332221	615.0344
2.3575-	.04599689	4.7351368	617.1258
2.3600-	.04588610	4.7370489	619.2221
2.3625-	.04577647	4.7389613	621.3235
2.3650-	.04566680	4.7408733	623.4301
2.3675-	.04555750	4.7427846	625.5420
2.3700-	.04544855	4.7446954	627.5589
2.3725-	.04533995	4.7466051	629.7609

Table 4 (Continued)

$0.2550 \leq \xi \leq 3.1250$

ξ	F	G	H
2.3750-	.04523170	4.7485138	631.9080
2.3775-	.04512381	4.7504229	634.0404
2.3800-	.04501626	4.7523309	636.1778
2.3825-	.04490908	4.7542393	638.3205
2.3850-	.04480224	4.7561467	640.4685
2.3875-	.04469573	4.7580531	642.6215
2.3900-	.04458958	4.7599585	644.7797
2.3925-	.04448377	4.7518642	646.9432
2.3950-	.04437830	4.7637689	649.1119
2.3975-	.04427317	4.7656727	651.2857
2.4000-	.04416837	4.7675753	653.4646
2.4025-	.04406392	4.7694784	655.6489
2.4050-	.04395981	4.7713805	657.8385
2.4075-	.04385603	4.7732830	660.0334
2.4100-	.04375259	4.7751845	662.2335
2.4125-	.04364948	4.7770850	664.4387
2.4150-	.04354669	4.7789844	666.6493
2.4175-	.04344424	4.7808828	668.8651
2.4200	.04334211	4.7827818	671.0861
2.4225-	.04324032	4.7846796	673.3125
2.4250-	.04313885	4.7865779	675.5443
2.4275-	.04303771	4.7884749	677.7813
2.4300-	.04293688	4.7903701	680.0235
2.4325-	.04283639	4.7922669	682.2713
2.4350-	.04273620	4.7941612	684.5241
2.4375-	.04263635	4.7960560	686.7824
2.4400-	.04253680	4.7979498	689.0461
2.4425-	.04243758	4.7998425	691.3149
2.4450-	.04233867	4.8017358	693.5894
2.4475-	.04224008	4.8036280	695.8691
2.4500-	.04214180	4.8055193	698.1541
2.4525-	.04204383	4.8074096	700.4445
2.4550-	.04194617	4.8093004	702.7403
2.4575-	.04184881	4.8111887	705.0413
2.4600-	.04175178	4.8130790	707.3481
2.4625-	.04165505	4.8149668	709.6600
2.4650-	.04155861	4.8168537	711.9773
2.4675-	.04146249	4.8187410	714.3002
2.4700-	.04136667	4.8206274	716.6284
2.4725-	.04127116	4.8225142	718.9622
2.4750-	.04117594	4.8243987	721.3013
2.4775-	.04108102	4.8262836	723.6458
2.4800-	.04098641	4.8281676	725.9958
2.4825-	.04089208	4.8300506	728.3512
2.4850-	.04079807	4.8319341	730.7124
2.4875-	.04070433	4.8338152	733.0786
2.4900-	.04061089	4.8356968	735.4505
2.4925-	.04051776	4.8375783	737.8281
2.4950-	.04[illegible]42491	4.8394586	740.2109
2.4975-	.04033235	4.8413388	742.5994

Table 4 (Continued)

$0.2550 \leqslant \xi \leqslant 3.1250$

ξ	F	G	H
2.5000-	.04024007	4.8432167	744.9931
2.5025-	.04014810	4.8450964	747.3927
2.5050-	.04005640	4.8469738	749.7976
2.5075-	.03996499	4.8488503	752.2080
2.5100-	.03987387	4.8507273	754.6241
2.5125-	.03978303	4.8526033	757.0457
2.5150-	.03969247	4.8544784	759.4728
2.5175-	.03960219	4.8563526	761.9055
2.5200-	.03951220	4.8582273	764.3438
2.5225-	.03942249	4.8601011	766.7877
2.5250-	.03933306	4.8619739	769.2371
2.5275-	.03924390	4.8638459	771.6922
2.5300-	.03915501	4.8657169	774.1528
2.5325-	.03906640	4.8675865	776.6191
2.5350-	.03897807	4.8694591	779.0910
2.5375-	.03889001	4.8713288	781.5685
2.5400-	.03880222	4.8731977	784.0516
2.5425-	.03871470	4.8750656	786.5403
2.5450-	.03862745	4.8769340	789.0348
2.5475-	.03854047	4.8788002	791.5346
2.5500-	.03845376	4.8806669	794.0405
2.5525-	.03836732	4.8825326	796.5517
2.5550-	.03828114	4.8843989	799.0690
2.5575-	.03819523	4.8862629	801.5916
2.5600-	.03810958	4.8881274	804.1201
2.5625-	.03802419	4.8899911	806.6542
2.5650-	.03793907	4.8918538	809.1940
2.5675-	.03785420	4.8937157	811.7396
2.5700-	.03776959	4.8955767	814.2907
2.5725-	.03768525	4.8974383	816.8477
2.5750-	.03760115	4.8992975	819.4104
2.5775-	.03751732	4.9011573	821.9788
2.5800-	.03743375	4.9030163	824.5531
2.5825-	.03735043	4.9048757	827.1332
2.5850-	.03726736	4.9067329	829.7188
2.5875-	.03718454	4.9085893	832.3102
2.5900-	.03710198	4.9104462	834.9075
2.5925-	.03701967	4.9123022	837.5106
2.5950-	.03693761	4.9141574	840.1194
2.5975-	.03685579	4.9160117	842.7340
2.6000-	.03677422	4.9178652	845.3544
2.6025-	.03669291	4.9197192	847.9806
2.6050-	.03661184	4.9215724	850.6130
2.6075-	.03653101	4.9234234	853.2509
2.6100-	.03645043	4.9252749	855.8845
2.6125-	.03637009	4.9271255	858.5440
2.6150-	.03628999	4.9289754	861.1995
2.6175-	.03621014	4.9308237	863.8609
2.6200-	.03613052	4.9326739	866.5280
2.6225-	.03605115	4.9345226	869.2011

Table 4 (Continued)

$0.2550 \leqslant \xi \leqslant 3.1250$

ξ	F	G	H
2.6250-	.03597202	4.9363705	871.8801
2.6275-	.03589312	4.9382176	874.5649
2.6300-	.03581446	4.9400638	877.2556
2.6325-	.03573603	4.9419093	879.9521
2.6350-	.03565784	4.9437539	882.6546
2.6375-	.03557989	4.9455991	885.3632
2.6400-	.03550217	4.9474420	888.0774
2.6425-	.03542468	4.9492856	890.7978
2.6450-	.03534742	4.9511276	893.5239
2.6475-	.03527039	4.9529689	896.2560
2.6500-	.03519360	4.9548114	898.9944
2.6525-	.03511703	4.9566517	901.7384
2.6550-	.03504069	4.9584912	904.4884
2.6575-	.03496458	4.9603299	907.2444
2.6600-	.03488870	4.9621692	910.0065
2.6625-	.03481304	4.9640077	912.7746
2.6650-	.03473760	4.9658440	915.5484
2.6675-	.03466239	4.9676809	918.3286
2.6700-	.03458741	4.9695171	921.1146
2.6725-	.03451264	4.9713524	923.9066
2.6750-	.03443810	4.9731870	926.7047
2.6775-	.03436378	4.9750221	929.5089
2.6800-	.03428968	4.9768551	932.3190
2.6825-	.03421580	4.9786887	935.1353
2.6850-	.03414213	4.9805201	937.9575
2.6875-	.03406868	4.9823522	940.7859
2.6900-	.03399546	4.9841835	943.6204
2.6925-	.03392244	4.9860139	946.4609
2.6950-	.03384964	4.9878437	949.3075
2.6975-	.03377706	4.9896726	952.1602
2.7000-	.03370468	4.9915008	955.0190
2.7025-	.03363252	4.9933282	957.8838
2.7050-	03356057	4.9951549	960.7547
2.7075-	.03348884	4.9969822	963.6320
2.7100-	.03341731	4.9988073	966.5133
2.7125-	.03334600	5.0006331	969.4047
2.7150-	.03327490	5.0024581	972.3004
2.7175-	.03320399	5.0042810	975.2019
2.7200-	.03313330	5.0061045	978.1096
2.7225-	.03306282	5.0079273	981.0239
2.7250-	.03299254	5.00974[illegible]3	983.9441
2.7275-	.03292245	5.0115705	986.8706
2.7300-	.03285259	5.013391[illegible]	989.[illegible]031
2.7325-	.03278293	5.015[illegible]123	992.7421
2.7350-	.03271347	5.0170314	995.6871
2.7375-	.03264420	5.0188497	998.6382
2.7400-	.03257515	5.0206687	1001.595
2.7425-	.03250628	5.0224856	1004.559
2.7450-	.03243763	5.02[illegible]3031	1007.529
2.7475-	.03236916	5.0261185	1010.505

Table 4 (Continued)

$0.2550 \leqslant \xi \leqslant 3.1250$

ξ	F	G	H
2.7500-	.03230090	5.0279346	1013.468
2.7525-	.03223284	5.0297499	1016.476
2.7550-	.03216497	5.0315645	1019.471
2.7575-	.03209729	5.0333770	1022.472
2.7600-	.03202982	5.0351902	1025.480
2.7625-	.03196254	5.0370027	1028.494
2.7650-	.03189545	5.0388144	1031.514
2.7675-	.03182856	5.0406254	1034.540
2.7700-	.03176187	5.0424372	1037.573
2.7725-	.03169535	5.0442468	1040.612
2.7750-	.03162904	5.0460557	1043.657
2.7775-	.03156291	5.0478639	1046.709
2.7800-	.03149698	5.0496728	1049.767
2.7825-	.03143123	5.0514796	1052.832
2.7850-	.03136566	5.0532858	1055.902
2.7875-	.03130030	5.0550926	1058.980
2.7900-	.03123511	5.0568973	1062.063
2.7925-	.03117011	5.0587027	1065.153
2.7950-	.03110530	5.0605060	1068.249
2.7975-	.03104068	5.0623101	1071.352
2.8000-	.03097623	5.0641121	1074.461
2.8025-	.03091197	5.0659147	1077.576
2.8050-	.03084790	5.0677167	1080.698
2.8075-	.03078401	5.0695180	1083.827
2.8100-	.03072030	5.0713173	1086.961
2.8125-	.03065677	5.0731172	1090.102
2.8150-	.03059342	5.0749165	1093.250
2.8175-	.03053026	5.0767151	1096.404
2.8200-	.03046726	5.0785117	1099.565
2.8225-	.03040445	5.0803090	1102.732
2.8250-	.03034182	5.0821056	1105.905
2.8275-	.03027937	5.0839015	1109.085
2.8300-	.03021709	5.0856968	1112.272
2.8325-	.03015499	5.0874914	1115.465
2.8350-	.03009306	5.0892854	1118.664
2.8375-	.03003131	5.0910787	1121.870
2.8400-	.02996973	5.0928714	1125.083
2.8425-	.02990833	5.0946634	1128.302
2.8450-	.02984710	5.0964547	1131.528
2.8475-	.02978604	5.0982454	1134.760
2.8500-	.02972515	5.1000355	1137.998
2.8525-	.02966444	5.1018249	1141.244
2.8550-	.02960389	5.1036136	1144.4[illegible]5
2.8575-	.02954352	5.1054018	1147.754
2.8600-	.02948331	5.1071623	1151.019
2.8625-	.02942328	5.10[illegible]761	1154.291
2.8650-	.02[illegible]36341	5.1107623	1157.559
2.8675-	.02930371	5.1125480	1160.854
2.8700-	.02924418	5.1143329	1164.145
2.8725-	.02918481	5.1161172	1167.143

Table 4 (Continued)

$0.2550 \leqslant \xi \leqslant 3.1250$

ξ	F	G	H
2.8750-	.02912561	5.1179009	1170.748
2.8775-	.02906657	5.1196840	1174.059
2.8800-	.02900770	5.1214565	1177.377
2.8825-	.02894899	5.1232483	1180.701
2.8850-	.02889045	5.1250295	1184.033
2.8875-	.02883206	5.1268027	1187.370
2.8900-	.02877385	5.1285887	1190.715
2.8925-	.02871579	5.1303681	1194.066
2.8950-	.02855790	5.1321468	1197.424
2.8975-	.02860016	5.1339250	1200.789
2.9000-	.02854259	5.1357025	1204.161
2.9025-	.02848517	5.1374795	1207.539
2.9050-	.02842792	5.1392558	1210.924
2.9075-	.02837082	5.1410302	1214.315
2.9100-	.02831388	5.1428053	1217.713
2.9125-	.02825710	5.1445798	1221.118
2.9150-	.02820047	5.1463524	1224.530
2.9175-	.02814400	5.1481258	1227.948
2.9200-	.02808769	5.1498985	1231.374
2.9225-	.02803153	5.1516693	1234.806
2.9250-	.02797553	5.1534408	1238.245
2.9275-	.02791968	5.1552105	1241.690
2.9300-	.02786398	5.1569809	1245.143
2.9325-	.02780844	5.1587493	1248.602
2.9350-	.02775305	5.1605185	1252.068
2.9375-	.02769781	5.1622858	1255.541
2.9400-	.02764273	5.1640539	1259.021
2.9425-	.02758779	5.1658200	1262.507
2.9450-	.02753300	5.1675856	1266.000
2.9475-	.02747837	5.1693506	1269.501
2.9500-	.02742389	5.1711164	1273.008
2.9525-	.02736955	5.1728802	1276.522
2.9550-	.02731536	5.1746440	1270.043
2.9575-	.02726132	5.1764062	1283.570
2.9600-	.02720742	5.1781684	1287.105
2.9625-	.02715368	5.1799300	1290.646
2.9650-	.02710008	5.1816910	1294.195
2.9675-	.02704662	5.1834502	1297.750
2.9700-	.02699331	5.185210[illegible]	1301.312
2.9725-	.02694014	5.1869695	1304.881
2.9750-	.02683712	5.1887269	1308.457
2.9775-	.02683425	5.1904852	1312.040
2.9800-	.02678152	5.1922430	1315.630
2.9825-	.02672892	5.1939988	1319.227
2.9850-	.02667647	5.1957540	1322.831
2.9875-	.02662417	5.1975101	1326.442
2.9900-	.02657200	5.1992643	1330.060
2.9925-	.02651998	5.2010180	1333.655
2.9950-	.02646809	5.2027711	1337.316
2.9975-	.02641636	5.2045251	1340.955

Table 4 (Concluded)

$0.2550 \leq \xi \leq 3.1250$

ξ	F	G	H
3.0000-	.02636475	5.2062771	1344.601
3.0025-	.02631328	5.2080272	1348.254
3.0050-	.02626196	5.2097762	1351.914
3.0075-	.02621077	5.2115287	1355.581
3.0100-	.02615972	5.2132786	1359.255
3.0125-	.02610880	5.2150267	1362.935
3.0150-	.02605803	5.2167756	1366.624
3.0175-	.02600739	5.2185226	1370.319
3.0200-	.02595688	5.2202705	1374.021
3.0225-	.02590651	5.2220165	1377.730
3.0250-	.02585628	5.2237619	1381.446
3.0275-	.02580618	5.2255082	1385.170
3.0300-	.02575621	5.2272526	1388.901
3.0325-	.02570638	5.2289966	1392.638
3.0350-	.02565658	5.2307400	1396.383
3.0375-	.02560[illegible]1	5.2324816	1400.135
3.0400-	.02555[illegible]68	5.2342240	1403.894
3.0425-	.02550837	5.2359659	1407.660
3.0450-	.02545920	5.2377039	1411.433
3.0475-	.02541016	5.2394468	1415.214
3.0500-	.02536124	5.2411859	1419.001
3.0525-	.02531247	5.2429246	1422.796
3.0550-	.02526382	5.2446640	1426.599
3.0575-	.02521529	5.2464015	1430.405
3.0600-	.02516690	5.2481386	1434.224
3.0625-	.02511863	5.2498752	1438.048
3.0650-	.02507049	5.2516099	1441.878
3.0675-	.02502248	5.2533456	1445.716
3.0700-	.02497460	5.2550808	1449.562
3.0725-	.02492684	5.2568141	1453.414
3.0750-	.02487920	5.2585469	1457.273
3.0775-	.02483170	5.2602806	1461.141
3.0800-	.02478432	5.2620123	1465.015
3.0825-	.02473707	5.2637439	1468.895
3.0850-	.02468993	5.2654749	1472.785
3.0875-	.02464293	5.2672053	1476.681
3.0900-	.02459604	5.2689339	1480.384
3.0925-	.02454928	5.2706634	1484.495
3.0950-	.02450264	5.2723912	1488.413
3.0975-	.02445613	5.2741196	1492.338
3.1000-	.02440973	5.2758456	1496.270
3.1025-	.02436346	5.2775731	1500.210
3.1050-	.02431731	5.2792988	1504.157
3.1075-	.02427128	5.2810242	1508.112
3.1100-	.02422537	5.2827491	1512.074
3.1125-	.02417958	5.2844736	1516.043
3.1150-	.02413391	5.2861964	1520.020
3.1175-	.02408836	5.2879200	1524.004
3.1200-	.02404293	5.2896418	1527.995
3.1225-	.02399761	5.2913631	1531.994
3.1250-	.02395241	5.2930840	

Table 5

Coefficients Required for Computation of Streamline Second Derivative

(a) $-0.2000 \leqslant \xi \leqslant 3.1200$

ξ	θ_3	θ_5
-.2000	.3539068	1.46309
-.1600	.1963534	1.74817
-.1200	.0395045	2.07860
-.0800	-.1215326	2.4637
-.0400	-.2920495	2.9161
.0200	-.5783937	3.71181
.0600	-.8000322	4.37803
.1000	-1.055248	5.141625
.1400	-1.353348	6.030656
.1800	-1.704959	7.064314
.2200	-2.122328	8.264207
.2600	-2.619577	9.654355
.3000	-3.212951	11.26146
.3400	-3.921149	13.11494
.3800	-4.765512	15.24704
.4200	-5.770424	17.69294
.4600	-6.963577	20.49079
.5000	-8.376296	23.68209
.5400	-10.04487	27.31111
.5800	-12.00590	31.42553
.6200	-14.30660	36.07641
.6600	-16.99517	41.31778
.7000	-20.12614	47.20717
.7400	-23.75971	53.80536
.7800	-27.96206	61.17643
.8200	-32.80576	69.38779
.8600	-38.37008	78.51016
.9000	-44.74134	88.61755
.9400	-52.01325	99.78724
.9800	-60.28725	112.0999
1.0000	-64.83394	118.7109
1.0400	-74.81906	132.8982
1.0800	-86.09598	148.4402
1.1200	-98.79590	165.1248
1.1600	-113.0592	183.9753
1.2000	-129.0361	204.1601
1.2400	-146.8865	226.0905
1.2800	-166.7806	249.6715
1.3200	-188.8992	275.5108
1.3600	-213.4339	303.4193
1.4000	-240.5878	333.4114
1.4400	-270.5753	365.7040
1.4800	-303.6227	400.4174
1.5200	-339.9685	437.6750
1.5600	-375.8538	477.6030
1.6000	-423.5723	520.3309
1.6400	-471.3710	565.9910
1.6800	-523.5502	614.7186

Table 5 (Continued)

(a) $-0.2000 \leqslant \xi \leqslant 3.1200$

ξ	θ_3	θ_2
1.7200	-560.4141	666.6522
1.7600	-642.2608	721.9329
1.8000	-709.4829	780.7052
1.8400	-782.3675	843.1162
1.8800	-861.2966	909.3159
1.9200	-946.6477	979.4574
1.9600	-1038.813	1053.696
2.0000	-1138.203	1132.192
2.0400	-1245.242	1215.106
2.0800	-1360.371	1302.602
2.1200	-1484.048	1394.849
2.1600	-1616.749	1492.016
2.2000	-1758.965	1594.277
2.2400	-1911.208	1701.606
2.2800	-2074.006	1814.763
2.3200	-2247.904	1933.390
2.3600	-2433.467	2057.810
2.4000	-2631.280	2188.230
2.4400	-2841.944	2324.841
2.4800	-3066.081	2467.834
2.5200	-3304.334	2617.406
2.5600	-3557.364	2774.753
2.6000	-3825.852	2937.077
2.6400	-4110.500	3107.581
2.6800	-4412.033	3285.471
2.7200	-4731.192	3470.957
2.7600	-5068.745	3664.249
2.8000	-5425.478	3865.562
2.8400	-5802.199	4075.112
2.8800	-6199.740	4293.119
2.9200	-6618.954	4519.806
2.9600	-7060.717	4755.397
3.0000	-7525.929	5000.120
3.0400	-8015.510	5254.205
3.0800	-8530.408	5517.885
3.1200	-9071.591	5791.394

Table 5 (Continued)

(a) $-0.2000 \leqslant \xi \leqslant 3.1200$

ξ	θ_3	θ_5
1.7200	204.0680	33726.96
1.7600	217.2386	38103.20
1.8000	230.9834	42952.07
1.8400	245.3146	48314.10
1.8800	260.2440	54232.38
1.9200	275.7837	60752.68
1.9600	291.9456	67923.51
2.0000	308.7416	75796.26
2.0400	326.1835	84425.29
2.0800	344.2831	93868.06
2.1200	363.0521	104185.2
2.1600	382.5021	115440.6
2.2000	402.6448	127701.8
2.2400	423.4919	141039.5
2.2800	445.0547	155528.4
2.3200	467.3449	171246.7
2.3600	490.3740	188276.7
2.4000	514.1532	206704.5
2.4400	538.6941	226620.5
2.4800	564.0079	248119.4
2.5200	590.1060	271300.0
2.5600	616.9996	296265.8
2.6000	644.7000	323125.0
2.6400	673.2183	351990.4
2.6800	702.5657	382979.7
2.7200	732.7534	416215.5
2.7600	763.7924	451826.5
2.8000	795.6937	489945.2
2.8400	828.4685	530710.4
2.8800	862.1277	574266.4
2.9200	896.6822	620763.0
2.9600	932.1430	670356.2
3.0000	968.5210	723207.5
3.0400	1005.827	779485.0
3.0800	1044.072	839362.7
3.1200	1083.266	903021.3

Table 5 (Continued)

(b) $-0.2000 \leqslant \xi \leqslant 3.1200$

ξ	x_4'	Δ_4'
-.2000	.4989449	9.110636
-.1600	.7225740	14.76402
-.1200	.9707396	57.01010
-.0800	1.248172	75.01910
-.0400	1.559940	336.9869
.0200	2.103635	11 78161
.0600	2.527341	13.35533
.1000	3.007756	16.79114
.1400	3.552845	23.00853
.1800	4.171022	27.02536
.2200	4.871265	35.89871
.2600	5.663102	45.16131
.3000	6.556579	55.73428
.3400	7.562226	73.27717
.3800	8.691013	92.97282
.4200	9.954307	117.8562
.4600	11.36383	151.3338
.5000	12.93162	187.2146
.5400	14.66998	234.4838
.5800	16.59144	290.4635
.6200	18.70072	364.0805
.6600	21.03469	451.6861
.7000	23.58236	555.4190
.7400	26.36481	681.0244
.7800	29.39521	831.1502
.8200	32.68677	1011.069
.8600	36.2527C	1223.727
.9000	40.10627	1487.835
.9400	44.26072	1774.849
.9800	46.72920	2127.551
1.0000	51.0854[illegible]	2338.431
1.0400	56.04991	2802.521
1.0800	61.36139	3327.977
1.1200	67.03302	3937.617
1.1600	73.07785	4642.444
1.2000	79.50888	5454.550
1.2400	86.33906	6387.191
1.2800	93.58128	7454.856
1.3200	101.2483	8673.348
1.3600	109.3531	10059.85
1.4000	117.9062	11633.02
1.4400	126.9264	13413.07
1.4800	136.4201	15421.81
1.5200	146.4020	17682.81
1.5600	156.8845	20221.42
1.6000	167.8800	21064.87
1.6400	179.4009	26242.38
1.6800	191.4595	29785.26

Table 5 (Continued)

(b) $-0.2000 \leqslant \xi \leqslant 3.1200$

ξ	x_4'	δ_4'
1.7200	204.0660	33726.96
1.7600	217.2386	38103.20
1.8000	230.9834	42952.07
1.8400	245.3146	48314.10
1.8800	260.2440	54232.38
1.9200	275.7837	60752.68
1.9600	291.9456	67923.51
2.0000	308.7416	75796.26
2.0400	326.1835	84425.29
2.0800	344.2831	93868.06
2.1200	363.0521	104185.2
2.1600	382.5021	115440.6
2.2000	402.6448	127701.8
2.2400	423.4919	141039.5
2.2800	445.0547	155528.4
2.3200	467.3449	171246.7
2.3600	490.3740	188276.7
2.4000	514.1532	206704.5
2.4400	538.6941	226620.5
2.4800	564.0079	248119.4
2.5200	590.1060	271300.0
2.5600	616.9996	296265.8
2.6000	644.7000	323125.0
2.6400	673.2183	351990.4
2.6800	702.5657	382979.7
2.7200	732.7534	416215.8
2.7600	763.7924	451826.5
2.8000	795.6937	489945.2
2.8400	828.4685	530710.4
2.8800	862.1277	574266.4
2.9200	896.6822	620763.0
2.9600	932.1430	670356.2
3.0000	968.5210	723207.5
3.0400	1005.827	779485.0
3.0800	1044.072	839362.7
3.1200	1083.266	903021.3

Table 5 (Continued)

(c) $0.2600 \leq \xi \leq 3.1200$

ξ	y_3'	y_3	$\overline{M}^{*2}$
.2600	1.070910	.01797159	1.521008
.3000	1.203534	.03397312	1.606218
.3400	1.364505	.05320468	1.69[illegible]781
.3800	1.557247	.07691691	1.77[illegible]365
.4200	1.785632	.1067330	1.86[illegible]659
.4600	2.053995	.1442750	1.94[illegible]376
.5000	2.367142	.19170[illegible]	2.031256
.5400	2.730377	.2454230	2.114071
.5800	3.149476	.3129906	2.193619
.6200	3.630752	.3937823	2.275729
.6600	4.181010	.5062408	2.354259
.7000	4.807577	.6405793	2.431094
.7400	5.518303	.8077789	2.506141
.7800	6.321561	1.014940	2.579332
.8200	7.226255	1.270493	2.650520
.8600	8.241815	1.584301	2.719934
.9000	9.378200	1.967946	2.787380
.9400	10.64590	2.434914	2.852838
.9800	12.05594	3.000847	2.916358
1.0000	12.81792	3.326469	2.947397
1.0400	14.46328	4.075556	3.008052
1.0800	16.28083	4.973948	3.066835
1.1200	18.28345	6.047079	3.123785
1.1600	20.48450	7.323916	3.178943
1.2000	22.89792	8.837333	3.232356
1.2400	25.53811	10.62451	3.284072
1.2800	28.42003	12.72736	3.334143
1.3200	31.55913	15.19300	3.382618
1.3600	34.97139	18.07417	3.429551
1.4000	38.67328	21.42984	3.474993
1.4400	42.68180	25.32567	3.518997
1.4800	47.01443	29.83460	3.561613
1.5200	51.68917	35.03750	3.602892
1.5600	56.72452	41.02374	3.642883
1.6000	62.13947	47.89189	3.681635
1.6400	67.95351	55.75044	3.719193
1.6800	74.18661	64.71849	3.755603
1.7200	80.85926	74.92654	3.790910
1.7600	87.99741	86.51732	3.825155
1.8000	95.60750	99.64660	3.858379
1.8400	103.7264	114.4841	3.890621
1.8800	112.3717	131.2143	3.921920
1.9200	121.5661	150.0376	3.952311
1.9600	131.3331	171.1712	3.981829
2.0000	141.6965	194.8501	4.010509
2.0400	152.6807	221.3280	4.038380
2.0800	164.3103	250.8790	4.065475
2.1200	176.6107	283.7980	4.091824
2.1600	189.6076	320.4026	4.117452